WILLAMETTE COVE
SITE CONSERVATION PLAN

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SECTION 1: INTRODUCTION

The Willamette Cove site conservation plan is a tool for protecting and enhancing the unique characteristics of the site and considering appropriate areas for future public access within an ever-evolving landscape due to clean-up design and actions, surrounded by invested communities.

The focus for the site conservation plan is based on Metro's Parks and Nature's mission to *Protect clean water, restore fish and wildlife habitat and connect people to nature close to home*. Metro's site conservation plans are typically a broad conservation vision based on historic and present-day habitat, surrounding habitats and land use and how the site fits into local, state, regional and federal conservation efforts, and provides rough cost estimates. After priority conservation actions are determined at the site and closer to action implementation, detailed restoration plans will be developed with more refined cost estimates as part of implementation efforts. Determination of any future formal public access will be defined through a site master planning process, with the eventual master plan for Willamette Cove subject to Metro Council approval.

This site conservation plan has been developed by Metro, with requested input from Tribes so that tribal priorities, Traditional Ecological Knowledge and interests can be considered and integrated into Metro Parks and Nature's site master planning efforts and future restoration plans.

The Willamette River is of significant historic, cultural and ongoing importance to multiple Tribes who have maintained strong ties to and relied upon the river, its resources and lands for traditional and cultural practices, sustenance and subsistence, and trade and travel since time immemorial. In October 2021, Metro has engaged with the six Tribes involved in the Portland Harbor Superfund Site to inform Metro's near and long-term activities for the Willamette Cove uplands, including evaluation of the contingency remedy option as well as priorities for habitat restoration and passive recreation. Since then, Metro staff and leadership have continued to engage with the identified representatives of each of the six Tribes and plan to continue this coordination and engagement throughout the life of the Willamette Cove project.

Tribal feedback is important to Metro's work at Willamette Cove due to the location of the site within the Portland Harbor Superfund site and the historical and ongoing importance of the Willamette River as a shared use are for multiple Tribes. There is a disproportionate burden placed on the federally recognized Tribes and their membership that participate in environmental cleanup efforts. Restrictions on access to natural resources due to contamination within the Portland Harbor Superfund Site is particularly challenging for tribal members. Tribal members consume more fish than other populations, prepare it differently, and consume or utilize fishes at various life stages based on their respective cultures, livelihood, and histories. Renewed access and ability to safely gather and consume natural resources, including fish, at Willamette Cove is therefore especially important to Tribes and tribal members. Tribal priorities shared with Metro to date include pursuing actions that will lead to clean healthy water, riparian and upland habitat for salmon and lamprey, habitat that can adapt to climate change impacts and desire for a gradual sloping landscape between terrestrial and aquatic habitat.

The site conservation plan includes an overview of the history of the site, goals and objectives for the plan, existing conditions, conservation targets and threats to those targets, planned cleanup

actions, the site master planning process to address access goals for the site and community engagement.

1.1 SITE HISTORICAL AND PRESENT-DAY CONTEXT

People have interacted with Willamette Cove and the Willamette River in many ways for many years, including for thousands of years prior to European colonization beginning in the 1840s. The Willamette River and its shorelines are part of the ancestral homelands, usual and accustomed areas and travel routes of Indigenous Peoples from multiple Tribes and Bands. Tribes and Indigenous communities continue to use and value the Willamette River and its shorelines today for life ways, ceremony, and other practices. These practices include harvesting First Foods and other resources. First Foods are traditional subsistence resources with special significance to Tribes. Examples include salmon, Pacific lamprey, and wapato, among others, although the significance of such resources is unique to each individual Tribe. These sacred resources are essential to feasts, ceremonies, and other cultural uses.

Beginning in the late 19th century the site hosted a variety of industrial uses including commercial dry dock, cooperage, plywood mills, lumber mills, ship repairs during WWI, WWII and Korean War, and rail lines. The West Parcel served as a plywood manufacturing plant from 1901 until 1963, transitioning to a lumber mill. The Central Parcel, initially developed in 1903 with shops in the uplands and dry docks extending into the water, hosted ship repair activities, later diversifying into plywood manufacturing and sawmill operations. The East Parcel, developed around 1915, operated as a wood products plant before focusing on plywood production. Please Map 2, Site Map, for parcel delineation. The cove in the Willamette River at this property was created through excavation to extend the land spit for the foundation of the adjacent railroad bridge beginning in the late 1890s. Prior to that excavation, the shoreline was relatively straight, in line with the remainder of the riverbanks of neighboring land. The industrial facilities and activities that occupied Willamette Cove from 1900s through the 1970s may have contributed to metals, PAHs, PCBs, phenol, formaldehyde, petroleum hydrocarbons, volatile organic compounds (VOCs), and dioxins/furans contamination in the soil, sediment, and groundwater.[1]

The significant changes that have occurred at Willamette Cove also occurred in other Pacific Northwest waterways and upland habitats, leading to widespread species declines including the collapse of fisheries and listing of several species as threatened or endangered under the Endangered Species Act (ESA). This site conservation plan focuses on providing healthy habitat to many declining or ESA-listed species, including but not limited to listed salmonids.

Metro's natural areas bond program and Willamette Cove

Metro's 27.3 acre Willamette Cove site including approximately 3,000 linear feet of waterfront, in the St. Johns and Cathedral Park neighborhoods of North Portland is located along the east riverbank of the Willamette River in Portland, OR (see Map 1 and Map 2). Willamette Cove has been owned and managed by Metro since 1996, when Metro purchased it using funds from the 1995 Metro Open Spaces Bond Measure 26-26. Metro's ownership extends to the ordinary low water line. Oregon Department of State Lands (DSL) has ownership from the ordinary low water line into the

[1] Maul Foster & Alongi, Inc. 2022. *Contingency Remedy Analysis Final Report. Willamette Cove.*

river, which differs from more typical situations in which DSL ownership extends from the ordinary high-water line. The property was bought with funds from the 1995 Greenspaces Bond Measure for the purpose of preserving and restoring a natural area, improving fish and wildlife habitat and extending the multi-use North Portland Greenway trail.

During the last three decades, three voter-approved natural areas bond measures have allowed Metro to protect approximately 18,000 acres across greater Portland. Metro, with the same and other funding sources, has also protected more than 100 miles of river and stream banks, opened six nature parks, and supported hundreds of community projects. Using funds from the 2019 parks and nature bond measure, Metro continues to protect land in 24 target areas, chosen for their high potential to enhance water quality, wildlife habitat, and outdoor recreation opportunities.

Of the 24 bond target areas, Willamette Cove is within the Urban Target Area which is bounded by the urban growth boundary. Bond investments for land acquisition or capital restoration within the urban growth boundary will target strategic opportunities for Metro to protect and enhance water quality and quantity, fish and wildlife habitat and access to nature. Priority projects enhance habitat connectivity and improve floodplain connectivity for water quality, flood protection and climate change resiliency.

Metro's past bond measures invested heavily within the current urban growth boundary, funding more than $212 million to protect 6,200 acres. This target area spans the confluence of the Columbia and the Willamette Rivers, including a significant portion of the unobstructed reaches of these basins and their tributaries. Located along the Pacific Flyway, the rivers provide an essential nexus for migrating wildlife; Allof the region's major rivers and many streams in the Urban Target Area support salmon, steelhead and lamprey. Federal, state and regional habitat conservation priorities, including oak woodlands, occur in this target area.

Sensitive plant and animal species occur in natural areas throughout the Urban Target Area. Because these habitats remain, the Urban Target Area sustains wild populations of federally and state-listed plants, amphibians, salmon and songbirds, as well as keystone species such as beaver.

Within the Urban Target Area just under 10 percent, or 26,705 acres, is currently preserved in public parks and natural areas. Some substantial habitat patches remain, and their preservation and restoration can be disproportionately important where they provide key wildlife habitat connectivity. The development of some of these areas would result in permanent disruptions to what were once functional biodiversity corridors.

Metro purchased the nine lots (27 acres) that are now Willamette Cove as one of its first natural area acquisitions under the 1995 open spaces bond measure. The Trust for Public Lands acquired the properties from the Portland Development Commission and sold them to Metro in 1996.

Table 1. Metro open spaces bond purchased land

PROPERTY NAME (PREVIOUS OWNER)	ACRES	BOND YEAR	DATE ACQUIRED	MANAGEMENT
Portland Development Commission via Trust for Public Land	27	1995	02/28/1996	Metro 1996 - Present
Multnomah County Foreclosure	0.06	1995	11/18/1996	Metro 1996 - Present

Additional information about the 1995 and 2006 open spaces bond measures and the 2019 parks and nature bond measure can be found on the Metro natural areas website.

Metro's natural areas and parks levy

By law, capital bond measures must be used for capital investments such as property acquisition and stabilization and capital restoration projects but not for other restoration projects or for long-term maintenance. The region's voters approved local option levies in 2013 and 2016 to help Metro care for its growing portfolio of natural areas and regional parks. The voters' investment has raised about $10 million per year to maintain and improve water quality; manage protected regional parks, natural areas and stream frontages; support current and implement new restoration projects; and provide new public access opportunities.

Contamination and Cleanup Efforts at Willamette Cove

Several years after Metro's purchase of the property, Oregon Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) included the property in the Portland Harbor Superfund Site and placed it on the National Priorities List, due to concerns of contamination in the Willamette River sediments and the potential risks to human health and the environment from consuming fish. In 2000, Metro, the Port of Portland (Port), and DEQ entered into a Voluntary Cleanup Agreement to remediate contamination from past industrial uses on the upland site. Between 2001 and 2017, remedial investigations were conducted to evaluate the contamination at Willamette Cove.

In 2004, a concrete block armored cap was constructed on a portion of the shore and into the river at the east end of the cove at Willamette Cove in response to contamination emanating from the neighboring McCormick & Baxter Superfund Site. McCormick & Baxter is a stand-alone Superfund site overseen by DEQ, and is currently unoccupied, with a large sediment cap as well as armored remedy installations along its shoreline and into the river that extend partially onto the Willamette Cove site shoreline. McCormick & Baxter's remediation action took place in 2004 and is currently being monitored by DEQ in perpetuity.

In 2008, soils with high metal concentrations were removed from the central uplands portion of Willamette Cove. In 2013, Oregon Health Authority recommended the site be closed for public health and safety because of contamination and physical hazards. In 2015 and 2016, additional soils with the highest levels of dioxins/furans were removed from much of the upland areas and the areas of excavation were replanted with native vegetation. Contamination remains throughout the site and in the river and poses risks to human health and the environment.

Based on the remedial investigations, DEQ issued its Record of Decision: Selected Remedial Action for Willamette Cove Upland Site, Portland, Oregon (ROD) in March 2021. The ROD requires that highly contaminated soils be removed and disposed of off-site. DEQ recommended that moderately contaminated soils be placed in perpetuity in an engineered on-site consolidation area. The ROD also includes a contingency remedy that allows Metro to remove and dispose of all, some, or none of the moderately contaminated soils off-site, with the exception of areas where native trees are present and will limit excavation.

In 2022, as permitted in the 2021 ROD, Metro Council voted unanimously to remove all excavated highly and moderately contaminated soils from the uplands. Soils with lower levels of contamination will be capped on site with clean soil. Metro Council is also committed to robust partner and community outreach and site master planning for Willamette Cove where the site master plan will be developed in coordination with the Tribes, local Indigenous community, public, conservation groups and other community stakeholder groups, local neighborhoods and Metro staff.

Currently at Willamette Cove there are two cleanup design efforts being conducted simultaneously: Upland and In-water. Within the 27 acres of the upland, Metro's ownership extends from the upland area of the site to the ordinary low water line of the river. The in-water clean-up is on Metro property and extends from top of bank, into the water. DSL has ownership from the ordinary low water line into the river, there is no private ownership. For the in-water clean-up, the superfund cleanup agreement is written in the form of an administrative settlement agreement and order on consent (ASAOC). Respondents to the ASAOC include the Port, City, and State of Oregon, by and through its Department of State Lands (DSL).

Although Metro has ownership down to ordinary low water, Metro is not a formal partner (Respondent) in the design of the in-water clean-up which includes the Port, the City of Portland and DSL. Metro is not a potentially responsible party (PRP) for the in-water superfund cleanup. Metro has coordinated with in-water parties for a long time about logistics, site access, information sharing, and as well as other factors. Metro is currently working with in-water parties to discuss clean up design of the bank and how it will influence habitat restoration opportunities as well as conservation priorities in this plan, and the overall design of the future Nature Park. Metro will continue to coordinate with in-water parties through the remediation design and action.

Natural and Cultural Resources Significance

The site is within the Lower Willamette Floodplain Conservation Opportunity Area (COA), as described in the Oregon Conservation Strategy (OCS COA 059).[2] The strategy highlights this area as an "important movement corridor for migratory and resident fish and wildlife" and notes that "restoration of the Lower Willamette River and associated floodplain and uplands has important implications not only for fish and wildlife, but also for the social and economic factors resulting from restoring ecological functions such as flood control and water quality."

[2] https://oregonconservationstrategy.org/conservation-opportunity-area/lower-willamette-river-floodplain/

In Metro's 2022 consultant report exploring a contingency remedy for contaminant cleanup, it was noted "Culturally- and spiritually-significant natural resources of the lower Willamette River are vital to Native peoples who have maintained strong ties to the River since time immemorial, including through fishing, hunting, gathering plants and raw materials, exchanging goods, and practicing ceremonial life (CTUIR, n.d.; CTWSRO, n.d.; Grand Ronde, n.d.; Nez Perce Tribe, n.d.; Siletz Tribe, n.d.; Yakama Nation Fisheries, n.d.; Yakama Tribal Council, 2016).

The lower Willamette River has, and continues to hold, great historical, natural, and cultural resource significance to Tribes.[3] Among the resources most frequently utilized by Tribes in the area are fish.[4] Culturally significant species include, but are not limited to, salmonids, Pacific lamprey, smelt, and sturgeon.[5] Tribal members consume fish and native freshwater mussels at rates that are higher than the consumption rates of non-tribal adults and are disproportionately impacted by fish contamination that restricts the safe consumption of fish and shellfish.[6] Important First Foods associated with the Willamette River also include native plants such as wapato and camas (CTUIR n.d., CTWSRO n.d., Grand Ronde n.d., Siletz Tribe n.d.). The Tribes' hunting, fishing, and gathering activities not only provide economic and health benefits in terms of nutritious and culturally appropriate food for tribal families, but also provide a cultural heritage of knowledge and skills that is passed down to younger generations, as well as providing opportunities for tribal members to bond over a shared activity and link generations.[7]

Due to Willamette Cove's location within Portland Harbor, and the need to ensure there is no continued source of contamination from Willamette Cove reaching the river, the site is unique within Metro's natural area portfolio. It will be examined and shaped by multiple communities: regulatory agencies, Tribes, local residents, regional communities and advocacy groups with a unique combination of interests and approaches.

1.2 GOALS AND OBJECTIVES OF THE SITE CONSERVATION PLAN

The goal of this site conservation plan is to identify conservation priorities and describe a general course of action that will protect and enhance the area as an environmental and recreational resource for Multnomah County and greater Portland. Willamette Cove will be managed with multiple habitat and access goals, with an overarching mission of restoring and enhancing existing habitats of value.

We recognize that conservation goals may need to be adjusted as we gain clarity on the design and on-site impacts from remedial actions for addressing site contamination. At this time, there is uncertainty as to what the ultimate design and level of impact of remedial options will be. These may range from extensive site disturbance, grading, and soil removal that necessitates native vegetation removal, to options that have a lighter touch on the site.

[3] EPA. 2020. Portland Harbor Superfund Site Community Involvement Plan
[4] EPA. 2020. Portland Harbor Superfund Site Community Involvement Plan
[5] EPA. 2020. Portland Harbor Superfund Site Community Involvement Plan
[6] EPA. 2020. Portland Harbor Superfund Site Community Involvement Plan
[7] IEC_Five Tribes 2015 Comment Memo on Portland Harbor Superfund Site_Releaseable 2016

To achieve the habitat goals, the site conservation plan establishes a series of priority objectives, including:

- Restore shallow water habitat in the Willamette River as refugia for migratory fish, particularly Pacific lamprey and juvenile and migrating salmonids. Habitat use preferences by various life stages of Pacific lamprey is currently not well-understood, but monitoring and research is underway along the Willamette River that will inform how Metro works toward achieving this objective.
- Protect and restore riparian forest (specifically cottonwood gallery forest) along the riverbank areas including a native understory.
- Preserve and improve conditions for oak and madrone woodland.
- As upland and riverine site cleanup progresses, explore appropriate planning and funding strategies to ensure strategic restoration and determine how and where appropriate public access can occur.
- Restore site to adapt to and be resilient to climate change.

Work to achieve these objectives will be based on the latest scientific understanding of the needs of selected priority species and methods to achieve effective habitat restoration. This is an ever-evolving science that depends on collaboration with researchers and partners to share information. The needs of priority species and habitats discussed in this plan are further detailed in the Oregon Conservation Strategy, ODFW[8].

While public access at the Willamette Cove is not the focus of this conservation plan, it is important to note that access within the natural area will be designed during the future site master planning process to support public experience of nature along this iconic river, while protecting and restoring the site's conservation targets. Metro commits to work with key partners including Tribes as well as community members and stakeholders during site master planning efforts. See sections 6 and 7 for more information.

[8] https://www.oregonconservationstrategy.org/

SECTION 2: SITE CONSERVATION PLANNING PROCESS

2.1 SITE CONSERVATION PLAN PLANNING AREA

Willamette Cove is part of the Lower Willamette River and Lower Columbia River landscape. This site conservation plan addresses conditions, plans and natural resource-related activities for the 27 acres within Metro's ownership. This does not include shallow water habitat. Metro is currently working with in-water parties to discuss clean up design of the bank and how it will influence habitat restoration opportunities, such as shallow water habitat, as well as conservation priorities in this plan, and the overall design of the future Nature Park. Metro will continue to coordinate with in-water parties through the remediation design and action.

2.2 SITE CONSERVATION PLANNING PROCESS

Developing a useful site conservation plan means providing for a site's habitat conservation, enhancement, and management as well as considering, but not determining, the potential opportunities for compatible public access. Actual decisions related to public access for Willamette Cove will be made in the near future through a formal, public site master planning process leading to Metro Council's approval of a site master plan. This Site Conservation Plan defines a conservation vision and builds on previous planning, restoration and management efforts while acknowledging that future conservation action requires analysis of the site, meaningful engagement of partners and stakeholders, and integration of Tribal, historic, current and future needs. This plan includes several important elements including identifying conservation targets, conducting a threats assessment and outlining Metro's public access planning process and project implementation. Together this information forges a path forward for a vital, healthy, publicly accessible natural area.

During the site conservation planning process, the following activities occur:

- Map and define major habitat types.
- Establish and prioritize habitat conservation targets.
- Describe current and desired future conditions.
- Define key ecological attributes for each of the conservation targets.
- Analyze threats and their sources for each conservation target and strategies (actions) to abate those threats.
- Establish and prioritize strategies and actions to restore habitat including assessment, inventory and long-term monitoring of projects and restoration activity.

Following completion of the Site Conservation Plan, specific priority restoration projects are more fully vetted and implementation details documented in Project Implementation Plans. Ongoing site stewardship activities, such as maintaining gates, fences, managing invasive species, and other regular and ongoing stewardship needs are documented in Site Stewardship Plans. Metro will monitor restoration projects and adjust as necessary (adaptive management). This may include having to change a goal if the old goal is viewed as no longer feasible. Metro is committed to continuing coordination with Tribes and local communities during this future planning. Metro will

coordinate with tribal cultural resource representatives during the planning stage of specific restoration actions.

Additional future commitments include coordination to understand the latest science on lamprey habitat needs and adaptive management including consideration of performance measures in the Trustee Council's Portland Harbor NRDA Monitoring and Stewardship Framework (Trustee Council 2014).

SECTION 3: SITE CONDITIONS

The Willamette Cove site, located between river miles 6.2 and 6.8 of the Willamette River, consists of a variety of habitats including shoreline, riverbank, open woodland and mixed deciduous upland forest (see Map 3).[9]

The site hosts a thriving population of Pacific madrone as well as Oregon white oak within the uplands. Willamette Cove is part of the oak-rich Willamette Bluffs above the river that extends off Metro property, adding to the effective habitat patch size, habitat connectivity, and importance of Willamette Cove's existing oak habitat. Oregon white oak in the Willamette Valley has been greatly diminished over time to a small fraction of its former extent, as have the many plant and wildlife species that are closely associated with oak habitats.

Due to over 100 years of disturbance and industrial use most of the habitat at Willamette Cove is in relatively poor condition and will require significant restoration and ongoing maintenance. However, the site continues to host a variety of migratory birds and other native wildlife species. Bald eagles, osprey, peregrine falcons and turkey vultures soar over the river and use the black cottonwood snags along the riverbank. California sea lions have been spotted in recent years within the cove area, and river otter and mink have been observed along the shoreline. Appendix A provides scientific names for all plant and animal species mentioned.

The Willamette River serves as habitat and a migratory corridor for numerous ESA-listed and tribally important aquatic and wildlife species, such as Chinook salmon, coho salmon, steelhead, Pacific lamprey, white sturgeon, bald eagle, osprey, double-crested cormorant, great blue heron, belted kingfisher, mergansers, cliff swallow, spotted sandpiper, mink, river otter, northern red-legged frog, and Pacific tree frog (EPA 2020). The National Marine Fisheries Service has designated the lower Willamette River as critical habitat for Lower Columbia River Chinook salmon, Lower Columbia steelhead, Upper Willamette River Chinook salmon, and Upper Willamette River steelhead. The lower Willamette River is proposed critical habitat for Lower Columbia River Coho salmon (EPA 2020).

Information on aquatic species' use of the river within Metro's property boundary is based upon multiple sources. While the data and observations of which species may use the shallow water area within Willamette Cove continues to evolve, regional partners concur that shallow water habitat in the Lower Willamette provides critical habitat for multiple listed fish species. Wild populations of listed species such as Coho and Chinook have been detected within this section of the Lower Willamette.[10]

[9] Shoreline includes the beach area that is both in and above river levels, often seasonally inundated. Riverbank at this site, due to the steep character and existence of heavy riprap, is set back from the shoreline. Also, riverbank needs to be included and addressed as this site has been classified as a "ROD (Record of Decision) Riverbank" by EPA; they have jurisdiction for Portland Harbor cleanup from the top of riverbank into the river at Willamette Cove. Not all sites within Portland Harbor have EPA jurisdiction to the top of the riverbank.

[10] NOAA. February 2017. Final Portland Harbor Programmatic EIS and Restoration Plan. Portland, Oregon.

Willamette Cove's location along the river (RM 6.8) sits in context with multiple land uses within the neighboring landscape (see Map 1).[11] The site is bounded by the Union Pacific railroad to the north and Burlington Northern railroad to the east. McCormick and Baxter Superfund Site is located to the east. To the west, former steel industry land has been rezoned to include residential, commercial, and open space property that has yet to be planned and developed for multiple uses, including recreation. Adjacent to that land lies City of Portland property including the Water Pollution Control Lab and Cathedral Park natural and recreation area. This area of publicly-owned land allows for a potentially contiguous path of greenspace and public recreation opportunity in the form of the planned North Portland Greenway Trail and Cathedral Park boat launch, beach, and 23 acres of parkland. Across the Willamette River lies 5,000+ acres of Portland's Forest Park, which stretches for eight miles above the Willamette River along Highway 30. Surrounding land use in the immediate vicinity of Willamette Cove is primarily residential with interspersed light industrial and commercial uses.

3.1 PHYSICAL ENVIRONMENT

Historically, this area consisted primarily of shallow water habitat, cottonwood gallery forest along the river, and oak-madrone woodland and savanna occupying much of the uplands (see Map 4 and Map 5). Part of the riverfront was gently sloping/floodplain wetland. Flats and draws were interspersed with steeper bluffs above the water. These bluffs, as well as the varying floodplain areas, are present in historic photos and drawings prior to industrial modification.

While there appears historically to have been a slight indentation in the form of a narrow cove area (see Map 5), the cove as it now exists was artificially created to support a train bridge. Initial excavation for the bridge started in the late 1890s with a smaller planned span, but revised plans led to a wider span bridge that opened in 1908. The resulting inlet, or "cove," serves as a collecting point for river sediments which have been deposited over time from prevailing northwest currents, as well as river channel operations. The cove also provides an alcove, or shallow water edge habitat with calmer flow than the main-stem river, that provides important habitat for migrating fish, including juvenile salmonids, Pacific lamprey, and sturgeon. The cove extends up to 800 feet away from the main river channel.

Topography

The topography of the upland portion of the site between the railroad tracks and the riverbank is predominately a flat terrace created by fill placement that occurred over time (see Map 6). The site steeply slopes down to the Willamette River. The upland portion of the site ranges from 30-55 feet higher than the river. There are two beach locations on the site: the cove and an area in the center of the site's shoreline. In total, there is approximately 0.7 miles of Willamette River shoreline along the Willamette Cove site.

The steep topography in the upland portion of the site continues off-site to the east along the formation called the Willamette Bluffs. The eastern (upstream) end of the site abuts fill supporting the railroad bridge as it extends south into the river. To the west, the upland portion of the site has flatter slopes.

[11] Portland Harbor Superfund Site Map_DEQ_River Miles

Soils

After 110 years of heavy industrial use, most of the historic soils have been modified such that current conditions at or near the surface bear little resemblance to original soils. The following soils are currently present at Willamette Cove (see Map 7):

- 19E - Haploxerolls, steep, located in the northeast corner of the site.
- 50A - Urban land, 0 to 3 percent slopes; covers most of the site.
- 51A - Small area north of 19E soils. These are Urban land-Latourell complex soils with 0 to 3 percent slopes.

Stream and wetlands

The Willamette River is Willamette Cove's key aquatic feature and extends over 3,000 feet along the shore. The shoreline is comprised mostly of riprap with black cottonwood and willows. Willamette Cove provides shallow-water habitat and riparian tree cover which is important for a variety of species. Map 8 displays hydrology and FEMA Floodplain mapping. There are no mapped wetlands on the site.

3.2 LAND COVER AND MAJOR HABITAT TYPES

Land cover includes natural habitats as well as human-altered areas such as pavement (see Map 3). The four major habitat types at Willamette Cove are: shallow water, riparian forest, oak–madrone woodland and mixed woodland (Table 2). Several small patches of other habitat types are also present.

Historically, the Willamette River in the Portland area was comprised of an extensive interconnected system of active channels, open slack waters, emergent wetlands, riparian forests and adjacent upland forests. Vegetation in bottomland and wetland forests consisted of black cottonwood, Oregon ash and willow with associated understory assemblages. Denser mixed conifer forests of Douglas fir, Bigleaf maple, western red cedar, western hemlock, grand fir and red alder dominated the west hills and some parts of the east terrace. Foothill savannas of Oregon white oak, Pacific madrone, red alder and Bigleaf maple were found on the east side of the river. Map 4 and Map 5 shows historical conditions at the site dating back to 1852 based on United States General Land Office (GLO) survey. At Willamette Cove, Map 5 shows a shrubland within a landscape of mixed oak woodland, oak savanna, prairie, upland conifer forest and a complex of riparian forests, wetlands, sloughs and islands that characterized the lower Willamette River floodplain through what is now Portland, Oregon.

Over the years, the majority of floodplain areas, bottomland forests, sloughs, islands and wetlands in the lower Willamette River have been filled and developed, leaving some larger natural resource areas intact, but primarily small strips and isolated pockets or narrow corridors of riparian forest, wetlands, and upland vegetation remain. The remaining floodplain is generally narrow and contains both undeveloped and developed areas.

While the historic land cover, landforms and functions of the lower Willamette and the Willamette Cove shoreline are not as they once were, this site conservation plan and future restoration plans

can identify and support actions that will work to rebuild and restore some of the historic habitats and functions.

Table 2: Dominant Habitat Types currently present at Willamette Cove

HABITAT TYPE	BRIEF DESCRIPTION
Shoreline (Shallow water habitat)	Currently limited by existing bank slope and infrastructure, there is 3,000 feet of shoreline along the Willamette River. The shallow water habitat also includes beaches and mudflats along the shoreline. There is a concrete block armored cap located on the east side of the cove, installed in 2004 to stop contamination from a neighboring site from impacting the cove.
Riparian forest	Riparian forests are exceptional in their diversity and habitat value. All wildlife needs water, and some depend primarily on riparian habitats to fulfill their life history requirements (Chapter 5, 2012 Portland-Vancouver *Biodiversity Guide*). More species in the Portland-Vancouver region are associated with riparian and open water habitats than any other habitat type (Appendix 2, 2012 Portland-Vancouver *Biodiversity Guide*). At least 167 native wildlife species, excluding fish, are closely associated with these habitats and another 130 make use of them at some point in their lives. Moreover, stream corridors provide the majority of the region's remaining biodiversity corridors between habitat areas (Chapter 6, 2012 Portland-Vancouver *Biodiversity Guide*). A mix of tree ages and the presence of snags are important characteristics of this habitat. Within Willamette Cove, this area is currently dominated by black cottonwood and non-native Lombardy poplar, with a few ash and willow trees present.
Oak (madrone) woodland	There is approximately 15 acres of Oregon white oak *(Quercus garryana)* and Pacific madrone *(Arbutus menziesii)* woodland. Oregon white oak is the only oak species native to the greater Portland-Vancouver region. Mature white oak habitat (i.e., savanna, woodland, and forest) provides important wildlife habitat, and its abundant acorns are a key element of food chains. Oak woodlands are identified as a focal habitat in the Oregon and Washington state conservation strategies and are characterized by an open canopy and dominated by Oregon white oak trees. A robust population of Pacific madrone is also present. This species is of conservation interest and does well in rocky, thin soils. Natural resource agencies and conservation organizations have noted concern and interest in protection of the madrone trees at this site. In general, the understory is relatively open with shrubs, grasses and wildflowers, although primarily non-native species. In healthy conditions, the tree canopy of oak woodlands may obscure between 30 to 70 percent of the sky.
Mixed Woodland (Upland Forest)	Mixed conifer/deciduous upland forests are a dominant upland habitat of the greater Portland-Vancouver region, especially in relatively mesic habitats. This cover type is typically dominated by conifers (typically

HABITAT TYPE	BRIEF DESCRIPTION
	Douglas fir, Wester redcedar and sometimes hemlock) and deciduous species such as big-leaf maple and red alder with the relative cover of conifer vs deciduous heavily influenced by logging, replanting and post-planting vegetation management history. Recently burned or logged sites may present as shrub habitat until trees regrow. At Willamette Cove, deciduous trees (Oregon ash, Pacific willow, Scouler's willow, madrone, and Oregon white oak) and open habitat dominate the landscape with few conifers present (Western red cedar, Douglas fir). The site has undergone years of anthropogenic influences. Although finer distinctions between relatively small patches could be made, this cover type is used here as a catch all for the largely artificial mix of species and stand densities in portions of this site.

The 2012 Biodiversity Guide for the Greater Portland-Vancouver Region describes the region's major habitat types in more detail.

The following photographs of the site display the current conditions and existing habitats including: shoreline, riverbank, open woodland, mixed woodland forest, Pacific madrone, Oregon white oak and riparian forest. The photographs reference the site by parcel: east, central and west. Map 2 shows parcel locations.

Photograph 1: Shoreline - concrete block armored cap
Facing South
Location: East Parcel
Year: 2023

Photograph 2: Shoreline - inner cove
Facing North
Location: East Parcel
Year: 2023

Photograph 3: Shoreline and Riparian Forest
Facing South
Location: East Parcel
Year: 2023

Photograph 4: Riverbank, Riparian Forest
Facing South
Location: Central Parcel
Year: 2023

Photograph 5: Riverbank, riprap
Facing South toward inner cove
Location: Central Parcel
Year: 2023

Photograph 1: Riverbank and Shoreline
Facing North
Location: Central Parcel
Year: 2023

Photograph 7: Oregon White Oak
Location: West Parcel
Year: 2022

Photograph 8: Open Woodland and Mixed Deciduous Forest
Facing North
Location: Central Parcel
Year: 2023

Photograph 9: Mixed Deciduous Forest
Location: West Parcel
Year: 2022

Photograph 10: Mixed Deciduous Forest
Facing East
Location: Central Parcel
Year: 2023

Photograph 11: Pacific Madrone
Facing East
Location: Central Parcel
Year: 2023

Photograph 12: Pacific Madrone
Facing East
Location: Central Parcel
Year: 2023

Photograph 13: Riparian Forest
Facing West
Location: West Parcel
Year: 2023

Photograph 14: Riparian Forest
Facing West
Location: West Parcel
Year: 2023

3.3 VEGETATION AND WILDLIFE

The Willamette River serves as habitat and migratory corridor for many species of fish and wildlife. The Willamette River and adjacent riparian and upland habitats also support federally and state listed species. The lower Willamette River has been designated by the National Marine Fisheries Service (NMFS) as critical habitat for Lower Columbia River Chinook salmon, Lower Columbia River steelhead, Upper Willamette River Chinook salmon, and Upper Willamette River steelhead. Table 3 lists state and federally listed species that could occur on or near Willamette Cove. Further studies will need to be conducted to determine if these species and/or their habitats are present at Willamette Cove, specifically.

Table 3: Federal and State Listed Species[12]

Common Name	Scientific Name	State Status	Federal Status
FISH			
Bull Trout (range-wide)	*Salvelinus confluentus*		T
Columbia River Chum Salmon	*Oncorhynchus keta*		T
Green Sturgeon (Southern DPS)	*Acipenser medirostris*		T
Chinook Salmon	*Oncorhynchus tshawytscha*		T
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	E	T
Steelhead	*Oncorhynchus mykiss*		T
Oregon Coast Coho Salmon	*Oncorhynchus kisutch*		T
Pacific Eulachon/Smelt (Southern DPS)	*Thaleichthys pacificus*		T
Pacific Lamprey	*Lampetra tridentata*		SOC
Snake River Sockeye Salmon	*Oncorhynchus nerka*		E
BIRDS			
California Brown Pelican	*Pelecanus occidentalis californicus*	E	
Streaked Horned Lark	*Eremophila alpestris strigata*		T
MAMMALS			
Red Tree Vole (North Oregon Coast DPS)	*Arborimus longicaudus*		C
PLANTS			
Willamette daisy	*Erigeron decumbens var. decumbens*		E
Nelson's checker-mallow	*Sidalcea nelsoniana*		T

KEY: T= Threatened, E= Endangered, C= Candidate, SOC= Species of Concern

[12] Table Sources:
www.fws.gov/sites/default/files/documents/OregonSpeciesStateList_4.pdf
www.fws.gov/office/oregon-fish-and-wildlife/species
Portland Harbor Superfund Site Programmatic Biological Assessment

Multiple vegetation and wildlife surveys have been completed at Willamette Cove. Described below are key plants and wildlife that Willamette Cove currently supports or has the potential to support. The site's understory is currently dominated by non-native species, and some trees are also non-native.

Key plants

Native plants currently found on site include Oregon white oak (*Quercus garryana*), Pacific madrone (*Arbutus menziesii*), black cottonwood (*Populus trichocarpa*), Oregon grape (*Mahonia aquafolium*) - tall and dwarf varieties, Pacific yew (*Taxus brevifolia*), Oregon ash (*Fraxinus latifolia*), ocean spray (*Holodiscus discolor*), Pacific willow (*Salix lucida*) and Scouler's willow (*Salix scouleriana*). Also present but in fewer numbers are Western red cedar (*Thuja plicata*) and Douglas fir (*Pseudotsuga menziesii*). (See Appendix B.6 Figure 1: Willamette Cove Vegetation Survey)

Oregon white oak is an important conservation strategy species for the region. Willamette Cove's oaks are part of a corridor for migratory birds that use the oak habitat while traveling the range of their yearly migrations. The oaks provide food specific to some of these species, as well as resting places during their travel.

Prior to 1850, oak woodland, savanna and prairie were major cover types in the Willamette Valley. Little of that area remains now. Remaining large heritage oaks indicate where other oaks used to live, showing how extensively they used to range. They can live for up to 500 years or more. Some of the native species associated with oak and sheltered by it include the native Western gray squirrel, Western bluebird, white-breasted nuthatch, madrone, larkspur, biscuit root and asters. Oak has value in wildfire risk reduction. They do not create the large load of fuel found in Douglas fir forests and they are fire tolerant. Invasive species such as Armenian blackberry are also highly flammable. A mature and healthy Oregon white oak and Pacific madrone woodland would offer greater wildfire resiliency as compared to blackberry-dominated vegetation for the site and surrounding residential and commercial areas.

Tribal members rely on native plants for food, medicine and materials for traditional use as well as being key elements of diverse and resilient habitats that support other culturally significant species. First Foods that are associated with the Willamette River include wapato and camas, however tribal members use many native plants including, roots and berries that are considered a basic link between Tribes and the landscape.

Key wildlife

Birds

Migratory and resident birds can also be important resources for tribal communities including species such as geese, ducks and herons. These bird species are present at Willamette Cove and are also important indicators of healthy ecosystems.

Partners in Flight-identified focal bird species for oak–madrone habitat considered at this site include slender-billed nuthatch, downy woodpecker, bushtit, Western wood-pewee, Bewick's wren,

and house wren.[13] All of these species have been observed at Willamette Cove over the past 25 years. Other native bird species using oak woodland habitat include black-capped chickadee, olive-sided flycatcher, Swainson's thrush, black-headed grosbeak, Northern flicker, Red-tailed and Cooper's hawk, American kestrel, quail and numerous other species.

Partners in Flight-identified focal bird species for riparian forest habitat include purple martin, willow flycatcher, red-eyed vireo, yellow warbler, Swainson's thrush, downy woodpecker and yellow-billed cuckoo. Other native birds using these habitats may include green heron, great blue heron, wood duck, Wilson's warbler, black-headed grosbeak, yellow-breasted chat, red-breasted sapsucker, song sparrow, and cedar waxwing. Riparian areas are particularly important for neotropical migratory songbirds. In addition, bald eagle, osprey, and many native songbirds and wading birds are known to use the site.

Fish

Survey information is limited for inner cove use by fish, though there is information regarding fish use of the cove outside of the Metro ordinary low water boundary.[14] However, it is important to recognize the habitat linkages within the shallow water areas, the shoreline and the riverbank and the wildlife resources that can use these areas. Willamette Cove is a part of a much broader corridor providing habitats critical for many fish species, including ESA-listed and tribally important salmonids, Pacific lamprey, and sturgeon. Fact sheets from the Five Tribes of the Portland Harbor Natural Resource Trustee Council provide important information regarding tribal members' cultural uses of and values for natural resources of the Willamette River, and approaches to conservation and restoration planning that consider these cultural relationships that can be used for conservation and restoration planning for the Willamette Cove site.[15]

In 1993, Oregon listed Pacific lamprey (also called eels) as a state sensitive species and gave them further legal protection in 1997 (OAR 635-044-0130; Kostow 2002) (Tribal Pacific Lamprey Plan). Tribes recognize that eels are fundamentally important and linked to the ecological health of the Columbia Basin in a similar manner as salmon and steelhead (Tribal Pacific Lamprey Plan). Pacific lamprey migrate up the Willamette River, past Willamette Cove, to the Willamette Falls, which is home to one of the few remaining major lamprey harvest opportunity locations for Native peoples.[16]

Metro has been a representative on the Pacific Lamprey Conservation Initiative (PLCI) team since 2012. Every 5 years PLCI revisits its conservation agreement, and Metro was invited back to recommit in 2017 and 2022. Metro Parks and Nature staff participate in the regional Lamprey conservation working group on both the conservation and policy side. PLCI has been gathering information on best management practices for monitoring and restoration of lamprey.

[13] Land Managers Guide to Bird Habitat and Populations in Oak Ecosystems of the Pacific Northwest (Part I). American Bird Conservancy. Altman, B. and Jamie L. Stephens. Partners in Flight. 2012.
[14] 2010 COP Watershed Management Report
[15] Portland Harbor Natural Resources Trustee Council, Tribal Focused Restoration
[16] IEC_Five Tribes 2015 Comment Memo on Portland Harbor Superfund Site_Releaseable 2016

Lamprey have been added as a named focal species (2019 Natural Areas Bond resolution) since Metro's last revision to its conservation prioritization framework in response to recognition of their importance to Indigenous people and food chains.

Other Wildlife

Wildlife species associated with oak woodland include Pacific tree frogs, common garter snake, rubber boa, Western gray squirrel, butterfly species, black-tailed deer, coyote and fox. White-breasted nuthatch (slender-billed subspecies) and Western gray squirrel are both special status species for the State of Oregon.

Wildlife species associated with riparian forest habitat include beaver, river otter, weasel and mink, coyotes, black-tailed deer, fox, and many small mammals such as water shrews, voles and mice. Reptiles and amphibians may include Pacific tree frog, various salamanders, northern red-legged frog, rough-skinned newt, common garter snake.

Additional wildlife species documented at the site include Western skink, Northwestern garter snake, California ground squirrel, Townsend's mole, black-tailed deer, brush rabbit (though are most likely being replaced by introduced Eastern cottontail), coyote, raccoon, otter, mink and Pacific chorus frog.

Biodiversity connectivity (corridors)

Native animals and plants require the ability to establish or re-establish local populations in a specific location to persist over time. Ongoing breeding interaction between small populations can create a larger, more genetically robust meta-population that can be more self-sustaining. In areas such as the Portland metropolitan area where significant habitat fragmentation has occurred, relatively narrow, linear connections (corridors) can help meet these needs.

Metro's Willamette Cove property is in north Portland and lies between the Willamette Bluffs and the Willamette River. This section of the river is part of the larger North Reach which extends from the Fremont Bridge to the Columbia River. Portland's Cathedral Park is close by providing adjacent cottonwood gallery and riparian forests continuing south and connecting to Willamette Cove. Smith and Bybee Wetlands are located nearby to the north, and Forest Park, an important area for migratory birds, is located to the northwest. The large oak trees along the Willamette Bluffs are part of a long, somewhat contiguous, span of Oregon white oak habitat that spreads out to the north and west, and to the south and east. As birds fly, they can move from nearby Baltimore Woods to the oak woodlands found in Oregon City and beyond. The City of Portland and Metro have been working with the Friends of Baltimore Woods to protect and restore the 30-acre corridor of native oak habitat which is also part of the North Portland Greenway regional trail.

Sites close to water resources, such as Willamette Cove is to the Willamette River, serve an important role in maintaining ecosystem vitality. Large rivers provide fundamental migratory corridors for fish and wildlife movement. Salmon and lamprey migrating to and from the Willamette Valley waterways travel through the lower Willamette. Restoration of this crucial

habitat for adult fish, as well as the availability of off channel refugia for juvenile fish and lamprey, is a high priority for the Portland Harbor Natural Resource Trustees.[17]

Willamette Cove's shallow water habitat may provide a steppingstone and habitat for organisms that must shift their ranges in response to climate change. With plans for provision of shallow water habitat, we expect improved habitat for fish and there may be increased visitation from wildlife dependent upon fish consumption, i.e., sea lions, osprey, and other fish-eating animals.

Climate change considerations

In coming decades, among other effects, climate change is expected to increase sea level, summer temperatures and the severity of winter storms, as well as reduce precipitation in summer in the Pacific Northwest. Additional Climate change effects include rising air temperatures, decreased snowfall, and increased rain, all of which will affect the timing and quality of runoff. These effects can threaten habitats and biodiversity as well as First Foods and other tribally significant resources, resulting in impacts to culture, ways of life, and the ability to exercise tribal treaty rights.[18]

Metro scientists carefully review the latest climate science and predictions to inform conservation planning. One example of this is the Tribal Climate Change Project, a collaborative program at the University of Oregon with support from the USDA Forest Service Pacific Northwest Research Station, the Affiliated Tribes of Northwest Indians, the Bureau of Indian Affairs and the North Pacific Landscape Conservation Cooperative.[19] In previous engagement with the Tribes on the Willamette Cove project, the Confederated Tribes and Bands of the Yakama Nation shared climate resources including the 2019 Climate Action Plan for the Territories of the Yakama Nation.[20] There are five principles for addressing climate change, which can be utilized at Willamette Cove including:

> **Monitor and track everything all the time.** Metro has devised a monitoring plan for Willamette Cove, please see Section 5.5. Over time as priorities are refined, monitoring of the site will be refined as will approaches to restoration activities and revisitation of goals.
>
> **Eliminate or reduce stresses unrelated to climate change and promote resilience.** Through design of the in-water and upland clean-up plans and eventual remedial action, Metro and its partners are working to decontaminate the site. In addition, this site conservation plan identified additional threats and stressors that will be addressed, including invasive species (see Appendix A-3), Coordination with the in-water parties is important, particularly when planning for climate-resilient habitat restoration and reducing impacts to resources onsite.
>
> **Plan for the long term with increased coordination.** Metro is committed to engaging with the Tribes, agencies and stakeholders now and in the future. Climate Change mitigation, adaptation and resilience are important priorities identified in this site conservation plan. Metro works to protect and manage healthy, connected natural areas to

[17] Portland Harbor NRT Restoration Priorities
[18] CRITFC – Climate Change Strategies
[19] https://tribalclimate.uoregon.edu/publications/
[20] https://www.critfc.org/wp-content/uploads/2021/05/YakamaNationCAP_2019-03-29.pdf

support upland species adaptation and stream health for aquatic species adaptation. Increasing climate resilience is a specific criterion in the 2019 Natural Areas Bond Measure. Climate resilience must be factored into both restoration project design as well as remedial clean-up project design.

Promote principled flexibility in goals and natural resource management. Metro utilizes an adaptive management approach to management and monitoring, see Section 5.5. While flexible, Metro remains focused on achieving our Parks and Nature mission in its decisions.

Accept that climate change may be painful. Metro appreciates this principle and understands the unforeseen and unfortunate outcomes from climate change, while remaining focused on the actions we can take to mitigate and adapt to climate change.

During the remediation design for the Willamette Cove upland and in-water work, the consultants will assess the impacts to future flow condition and sea level rise of the Willamette River. The outcome of the assessments will be used to develop a resilient and stable design for Willamette Cove and associated habitat types. If future storm patterns produce increased amounts of precipitation over shorter durations, there is an increased likelihood that upland soils will have their infiltration capacities exceeded leading to potential increased erosion of upland soils. Subsequently, close coordination with upland source control efforts will be necessary during design to ensure that proper operations and maintenance procedures of capped upland areas and riverbanks are protective of the in-water remedy.

Planning tools such as The Nature Conservancy Resilient Lands Mapping Tool provides mapping of the "Resilient and Connected Network", a proposed conservation network of representative climate-resilient sites designed to sustain biodiversity and ecological functions into the future under a changing climate. The scale of the mapping is too coarse to capture specific information about Willamette Cove, but generally the tool shows Willamette Cove as part of a large expanse of lands mapped as "Developed". Portions of the shoreline in and around Willamette Cove contain small areas of mapped "Average to Median Resilience" score zones. A site's Resilience Score estimates its capacity to maintain species diversity and ecological function as the climate changes. It was determined by evaluating and quantifying physical characteristics that foster resilience, particularly the site's landscape diversity and local connectedness. The tool also maps "Connectivity and Climate Flow". Climate flow refers to the gradual movement of populations in response to changes in the climate. Over time, climate flow results in range shifts and the formation of novel communities.

The Nature Conservancy's tool estimates climate flow using a continuous wall-to-wall model of landscape permeability based on anthropogenic resistance (resistance to movement caused by human modification) and climatic gradients (upslope, northward and riparian). The right-bank Willamette River shoreline, including Willamette Cove, is mapped as below average flow, which indicates areas with low permeability where movement is blocked. The developed nature of the City of Portland and the low permeability of the shoreline wedged between the city and the river create major challenges for ensuring climate resilience for species utilizing Willamette Cove and other lower Willamette habitats. The tool also provides maps of "Biodiversity Value". In this map,

The Nature Conservancy assembled information on places recognized for their biodiversity value (rare species, intact habitat, or exemplary natural communities) in separate studies. The lower Willamette, including Willamette Cove, is mapped as a high biodiversity value zone.

The following general patterns of climate change-induced effects are expected. Direct climate change effects that may occur:

- Increased summer temperatures and prolonged drought may reduce the survival of species near the edge of their tolerance range and facilitate the increase of other species, including some invasive species.
- Stream temperature rise and streamflow (especially late season streamflow) decrease will impact salmon and lamprey spawning and rearing habitat and as migration corridors. The resulting alteration of salmon migration patterns, degradation of salmon spawning and rearing grounds, and the increase of predators and aquatic contaminants, if not addressed, could lead to salmon, lamprey and other fish extinctions."[21]
- Increased storm severity coupled with rising sea-level may leads to more frequent and severe flooding, including inundating areas of the site that previously were dry. Planning for the creation of healthy riparian habitat can support climate change resiliency. Restoration planning can include laying back of the riverbank in certain areas, which can allow for flood storage during these high-water events. In addition, ensuring that these functional floodplain and riparian areas host diverse native vegetation would contribute organic matter and woody material to the river and provide structure for juvenile salmonids during large storms/flooding events.

Indirect climate change effects that may occur:

- Projected sea level rise may affect the Columbia River with proximal affect to the Lower Willamette. Related to this includes consideration of increased dam releases in the Columbia for rising energy demands. This may lead to higher water levels within the Willamette than historically noted for the summer season.
- Increased storm severity is likely to lead to episodic soil erosion throughout the site. This could damage restoration plantings and potentially add soil-bound contaminants to the river.
- Loss of synchronicity of plant reproduction and pollinators.
- Range shifts by undesirable plants leading to increased competition.
- Disease introductions and/or increased vulnerability to disease.
- Mortality of trees in marginal sites or where the combined effects of drought, storms and pests can kill otherwise healthy trees.

3.4 CULTURAL RESOURCES MANAGEMENT

[21] Columbia River Inter-Tribal Fish Commission's "Wy-Kan-Ush-Mi Wa-Kish-Wit Spirit of the Salmon Strategy, 2014.

To help inform potential future conservation and public access master planning work at the site, Metro has contracted with Willamette Cultural Resources Associates (CRA) to complete a desktop survey of the site and to make recommendations for Metro's consideration regarding potential additional activities to pursue regarding the investigation and protection of archeological resources which may be present at the site. The desktop survey completed by Willamette CRA utilized best available information regarding the Willamette Cove site including several previously completed surveys at the site. The desktop survey and recommended next steps have been communicated to the appropriate Tribal Historic Preservation Office (THPO) or cultural resource contacts at each of the Tribes involved in the project. Metro staff will continue to support this coordination and ensure that pertinent information resulting from this work will inform any future ground disturbing activities at the site which may be part of conservation activities at the site or future public access development.

3.5 RECENT MANAGEMENT HISTORY

Willamette Cove has been directly managed by Metro since acquisition in 1996. The City of Portland completed some initial planning work (see Appendix B.7) in 1999 for a planned transfer of management. In 2000, the site was included for consideration within the Portland Harbor Superfund study area and management of the site remained with Metro. Management actions since that time have centered primarily on characterization of contaminants with three sediment removal actions, under Oregon DEQ's Voluntary Cleanup Program (VCP). For more detailed information, please see Appendix B.8.

3.6 EXISTING AND FUTURE PUBLIC USE

Willamette Cove occupies a section of the Lower Willamette River within the larger context of the Willamette River Greenway system. This series of parks and natural areas is comprised of over 10,000 acres along the Willamette River. Most of it is owned by the Oregon Parks and Recreation Department, with some additional lands owned by the DSL and cities. Some of these lands are large, developed parks, and others are undeveloped natural areas along the river.[22]

A multi-use trail alignment through Willamette Cove is shown on the City of Portland's comprehensive plan and is part of the regional trail system adopted by Metro Council. The proposed trail is part of the longer North Willamette Greenway. This site-based conservation plan addresses the Willamette Cove property only.

Currently, there are varying levels of unauthorized public use throughout the site, such as walking, jogging, dirt bikers, dog walkers, fishing, water recreation and camping. In addition, "live aboard" boats anchor in the DSL's jurisdictional waters within the river. Boat residents access the Metro site to use the beach or access adjacent developed areas. This activity occurs despite closure signs installed following the 2013 Oregon Health Advisory regarding unsafe levels of lead and dioxin present in the soils throughout.

[22] Oregon Parks and Recreation Division-WRG

The site master plan that Metro will develop will help identify appropriate levels of public access and use of Willamette Cove once remediation of soil contamination is completed, to allow passive recreational use consistent with conservation goals at the site.

As per Metro Council Resolution 20-5149, "Metro Council affirms its support of and commitment to explore trail development, habitat restoration, and a broad range of passive recreational activities at Willamette Cove consistent with its use as a natural area, for example but not limited to, walking, hiking, bicycling, beach access, wildlife viewing, picnicking, and cultural interpretation."[23]

[23] Metro Council Resolution 20-5149: For the Purpose of Directing that Willamette Cove be included in the list of Metro Parks and Natural Areas Eligible for 2019 Bond Funding and Development of a Plan for Public Engagement.

SECTION 4: CONSERVATION

This section provides a comprehensive framework for conservation planning at Willamette Cove. This framework generally follows The Nature Conservancy's 5S Framework for Site Conservation and includes analyzing the site, establishing conservation targets, evaluating key ecological attributes for each conservation target, analyzing threats affecting conservation targets, and developing action plans to abate serious threats. More detailed information is available in Appendix A.

4.1 CONSERVATION TARGETS

Conservation targets are composed of the species, suites of species (guilds), communities, and ecological systems that represent and encompass the full array of native biodiversity of the site, reflect local and regional conservation goals, and are viable or at least feasibly restorable (The Nature Conservancy, 2007). The conservation targets selected for this plan capture what has been identified by Metro and partners as the best opportunities to advance the conservation of water quality and fish and wildlife habitat within a regional and historic context at Willamette Cove. As previously mentioned, this plan attempts to integrate local, regional, state, federal and Tribal conservation plans and priorities with the opportunities the site provides in the modern landscape. Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (see next section).

Post-industrialization of the Willamette River through Portland and the landscape in and around Willamette Cove has resulted in a regional and local loss of certain functions, soil composition and habitat types. Metro is suggesting a functional approach to identify conservation and restoration opportunities at the site. This means assessing the current structure, composition and potential function as well as the landscape position of the site and how it interacts with the river today, within the dramatically altered modern landscape. Metro will then use that information to identify and restore species, habitats and functions that are best suited to benefit from and provide benefit to the current and anticipated future river and landscape.

Metro's conservation targets are typically habitat types rather than species. Metro manages for healthy, diverse, connected, resilient habitat and integrating site level and landscape ecology which the agency believes can provide for the needs of many tribal members' identified priority species, including salmon, steelhead, lamprey, sturgeon, eulachon, wapato, camas, serviceberry and oaks. Metro also manages to protect and restore as many native plant species as possible, with additional focus on those species identified in Federal, State, Regional and local conservation plans as plant species of concern. Map 9 shows the habitat-based conservation targets for Willamette Cove, and Table 4 provides brief target descriptions.

The conservation targets for the site include shallow water habitat along the Willamette River migratory fish pathway, oak–madrone woodland, and riparian forest. Metro is not a partner in the in-water remedial design; however, Metro is collaborating with in-water parties to discuss opportunities for restoration of fish, such as salmon and lamprey, habitat, and provide clean water in this in-water zone. More detail about each of these conservation targets can be found in Appendix A.1.

Table 4: Willamette Cove conservation targets and associated characteristics of the healthiest habitats

CONSERVATION TARGET*	CHARACTERISTICS OF HEALTHY HABITAT
Shallow water habitat	• Off river refugia for migrating salmon and lamprey and appropriate water depths to support target fish species and provide shelter from high river flows for fish • Presence of large wood for cover • Presence of cool, clean water • Sediment comprised of sand, silt, mud, and small organic sediments
Riparian forest	• Wide forest bands alongside the river, with over 200' width ideal. • At last 50% cover of native shrubs and at least 40% cover of native trees • High species richness, with at least 18 species of native grasses, forbs, herbs and ferns, and at least 15 species of native trees and shrubs. • Continuous riparian forest with only few, small gaps. • Standing snags and dead downed wood, and contributing large wood to the river • Connected to the floodplain • Shading shallow water habitat • Providing nutrients, organic matter, and terrestrial insects to shallow water habitats • Providing soil stability on riverbanks
Oak (madrone) woodland	• 30-60% canopy cover, dominated by Oak and Madrone • Canopy architecture is an appropriate mix of large open grown trees and younger trees. • Greater than 50% relative cover of native grass and forbs • Manage native plant and shrub diversity that will provide First Foods • Habitat-associated bird species present for foraging, nesting, and resting during migration periods[24]

*Note that these do not reflect current conditions at Willamette Cove nor do they indicate the desired future condition for these conservation targets. See Table 5 below for future conditions.

The opportunities and challenges inherent within site ownership must be considered during both the site conservation plan, site master planning, and site stewardship planning processes as well as

[24] Rockwell, S. M., J. L. Stephens, and B. Altman. 2022. Population and habitat objectives for land birds in prairie, oak, and riparian habitats of western Oregon and Washington. Version 2.0. Prepared for Oregon-Washington Partners in Flight, Pacific Birds Habitat Joint Venture, Bureau of Land Management, and U.S. Forest Service. Klamath Bird Observatory, Ashland, OR, and American Bird Conservancy, Corvallis, OR.

future restoration plans. This is the only site in Metro's natural area portfolio that has ownership to the ordinary low water line, and as such portions of the land are inundated for much of the year. This limits the actions and public uses possible for the inundated zone but provides critical floodplain habitat for ESA-listed juvenile salmonids and other aquatic species.

The methodology for determining conservation targets is discussed in detail in Appendix A.1: Conservation Targets. Using onsite natural habitat types and regional conservation planning efforts as guides, conservation targets were selected that encompass the site's biodiversity values and local, regional, national and Tribal conservation priorities.

4.2 KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy, 2007). KEAs define the conservation target's viability (Table 5). They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution, or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. KEAs are rated from poor to very good. Note that a rating of "Good" is considered the minimum rating needed to have a healthy and viable habitat. Additionally, slower growing species, such as oaks, may not be able to achieve a higher rating in the time period covered by this plan as compared to faster growing species such as cottonwoods. This rating helps establish the restoration goals and guide us in development of restoration actions for the conservation targets. The methodology for KEAs are discussed in detail in Appendix A.2: Key Ecological Attributes.

Metro is committed to adaptive management and appropriate monitoring to adapt our restoration projects and site management to changing conditions and circumstances and will use the best available science. This includes adaptation of which performance measures we use to measure progress toward reaching our goals. For example, the Trustee Council's Portland Harbor NRDA Monitoring and Stewardship Framework, may supplement in the future Metro's implementation of the Nature Conservancy's key ecological attribute (KEA) methodology and provide helpful information for the development of monitoring frameworks and associated performance standards.

Table 5: Summary of Key Ecological Attributes (KEAs), indicators, current and desired future conditions

CONSERVATION TARGET	KEAS	INDICATOR	CURRENT CONDITION	DESIRED FUTURE CONDITION FOR THIS SCP (10-15 years)	DESIRED FUTURE CONDITION LONG-TERM (after 15 years)
Shallow water habitat (measurements should be taken in May)	Substrate	Proportion of fine sediment cover	Poor	Good	Very Good
	Water depth	Mean water depth	Poor	Good	Very Good
	Structural refugia in-water	% underwater structural cover per 500 sq ft	Poor	Good to Very Good	Very Good
Riparian forest	Shrub layer	% native shrub cover	Fair	Good	Very Good
	Tree layer	% native tree canopy cover	Good	Very Good	Very Good
	Riparian habitat continuity	Gaps in woody vegetation	Poor	Good	Very Good
Oak (madrone) woodland	Canopy cover	Percent cover	Poor	Fair	Good
	Native understory	Percent native shrub, forb and grass cover	Poor	Fair	Fair

4.3 THREATS AND SOURCES

An effective conservation strategy requires understanding the threats to conservation targets and the sources of those threats. For example, adjacent development and subsequent disruption of natural systems place stress on the resource and its inhabitants and threaten the health of the greater ecosystem. At Willamette Cove, the following threats are evident:

- Invasive trees, shrubs, grasses and forbs
- Human disturbance
- Historical industrial use and contamination
- Adjacent industrial use

- Habitat fragmentation (small patch size)
- Episodic extreme weather events including those due to climate change

The methodology for defining threats and sources was established under The Nature Conservancy's 5-S Framework (Table 6). It is a well-established, objective methodology with a scientific basis, and is described in more detail in Appendix A.3: Threats and Sources.

Table 6: Summary of threats to conservation targets at Willamette Cove

CONSERVATION TARGET	THREAT	COMMENTS
All	Disturbance or destruction of habitat during implementation of remedial actions including tree removals, compaction, removing anthropogenic debris, laying back bank and excavation of soils. The threat of recontamination during and after remedial action.	Despite Metro efforts to coordinate on remedial action planning and implementation, the ultimate design and on-the-ground impacts from the remedial actions may impact priority resources. Metro will work with the Port on tree retention, where feasible in the uplands due to levels of contamination. For these areas, tree roots will be hand excavated. Compaction from machinery during excavation and removal of contaminated soil and debris will be rectified prior to site restoration. Clean-up of the upland and the in-water will be sequenced to eliminate the threat of recontamination by both actions. As details of remediation action are further along, this table will be updated. After remedial action, depending on the the remedy selected by DEQ, will be monitored and tracked through 5 year reviews.
Shallow water habitat	In-water habitat may not be possible at the eastern portion of the cove due to existing concrete block armored cap	McCormick and Baxter Site cleanup-required concrete block armored cap installation located at the cove that will remain in perpetuity – any habitat improvement must work with this along the edge of the eastern portion of the cove. There is potential for artificial aquatic invertebrate habitat creation (freshwater mussels, etc.) in this area. Metro will be working with EPA/DEQ and others to determine habitat solutions on the cap while being sure the cap can be monitored.
	Legacy toxics: In-water remediation of contaminants	Climate change could cause more extreme water velocity and flooding, which could potentially

CONSERVATION TARGET	THREAT	COMMENTS
	will involve a combination of dredging, capping and monitoring areas requiring management in perpetuity	destabilize restoration or remediation efforts. This elevates the importance of providing shallow water refugia where water velocities, vegetation and wood can slow erosive forces and reduce the risk of destabilization of sediments. Metro will develop contingency actions to protect restored habitat in the event of climate events.
	Increased water temperatures over sustained periods can lead to proliferation of harmful algal blooms and toxic cyanobacteria	Installation of vegetation, large wood and boulders on the banks to help with cooling water temperatures may help reduce this threat. Water quality and quantity improvements along the Willamette River, which depends on the actions of many agencies, municipalities, and individuals, is needed to address this issue throughout the river.
	Steep riverbank: In-water parties may not design areas outside what is required to restore habitat by EPA	Metro is coordinating with in-water parties on opportunities for habitat restoration and creation along the banks to increase shallow water habitat
	Climate change: altered hydrology and higher storm frequency/severity.	Establishing riparian forest can stabilize areas adjacent to shallow water habitat. Large wood and boulders on the shoreline can reduce flow velocities in shallow water areas.
Riparian forest	Invasive species: present in all vegetative layers including trees	Invasive overstory and understory will require removal
	Human use: current and future including potential trail and infrastructure development	The intentional design and implementation of trails and fencing for site access can help reduce some of the impacts on habitat and wildlife by concentrating human use in specific areas and reducing habitat fragmentation and disturbance
	Climate change induced weather events including episodic flooding followed by soil erosion	Reduction of the steeper banks could support tree root stabilization. Ensuring a densely-vegetated tree, shrub and forest floor layer will help stabilize soils.
Oak (madrone) woodland	Fire suppression: allows other tree species to overtop and block necessary sunlight	Oak habitats are anticipated to be more robust against climate change in the northern Willamette Valley compared to other native tree species. However, habitat management including oak release will be necessary to maintain and grow large healthy trees. Oaks and oak-associated shrubs, grasses and forbs are fire-dependent. Other

CONSERVATION TARGET	THREAT	COMMENTS
		periodic disturbance, such as mowing, can mimic (but not replace all of) the effects of fire.
	Invasive species: present in all vegetative layers	Invasive overstory and understory will require removal.
	Human use: current and future	The intentional design and implementation of trails and fencing for the site, will reduce some of the impacts on habitat and wildlife by concentrating human use in specific areas and reducing habitat fragmentation and disturbance
	Climate change: biggest threat may be reduced evapotranspiration due to prolonged droughts and elevated heat	Although Oregon white oak, madrone, and other species associated with this habitat type are more drought-resilient than many other forest types, these species may still succumb to stress from prolonged drought. Planting a variety of canopy and shrub species that can co-exist is one strategy to retain canopy if some canopy species die from drought. For example, Ponderosa pine may be planted alongside oak and madrone.

SECTION 5: MANAGEMENT ACTIONS

5.1 RESTORATION

This conservation plan outlines strategic actions to be carried out at Willamette Cove in the near term during implementation of site remedial actions, and over the 10 to 15 years following that period. They are based on the short- and long-term goals for the conservation targets. The strategic actions described here are general courses of action to achieve these objectives and not highly prescriptive courses of action. Specific prescriptions will be developed by Metro staff and partners to address site-specific conditions encountered in the areas targeted for restoration action. To serve the unique nature of the riverine site, upland habitat restoration will be done in collaboration with the larger in-water habitat work, working closely with river conservation partners.

The Oregon Conservation Strategy for the Lower Willamette River Floodplain Conservation Opportunity Area (COA 059) provides guidance to attain habitat restoration goals specific to this Conservation Opportunity Area. For shallow water habitat, riparian forest and oak-madrone woodland, pertinent recommended actions which could apply to this site include:

- Protect, restore and create shallow water and off-channel habitats
- Improve aquatic habitat complexity and diversity
- Improve riparian buffer density, health and width, establish high species diversity (including planting cottonwoods)
- Maintain and expand Oregon white oak habitat
- Restore floodplain function and connectivity
- Remove invasive species to reduce stress on these habitats and create more resilient habitats

Due to the location of Willamette Cove within the larger context of Portland, it is important to note the work started by the City of Portland regarding conservation opportunities. In 2010, the Portland City Council adopted the River Plan/North Reach, a comprehensive plan for the Willamette River waterfront from the Fremont Bridge to the Columbia River.[25] In 2011, the plan was subsequently appealed to Oregon Land Use Board of Appeals (LUBA) and remanded. To date the City of Portland is conducting an Economic Opportunity Analysis (EOA). After release of the EOA and public comment, the City of Portland will update the North Reach Plan to bring forth to City Council. In addition, the current River Plan/North Reach legislative record does not contain sufficient information to determine that the City satisfied the Goal 15 inventory requirement. In 2014, LUBA explained that the City must update its Goal 15 inventory if portions of the inventory were used to develop the new code, or the City must adopt findings to explain why the Goal 15 inventory did not need to be updated.[26] Among other objectives, the North Reach Plan will propose to update environmental code to protect and enhance ecological functions and values, and recommended acquisition of key natural resource restoration sites.

[25] Willamette River Natural Resource Inventory Report: Riparian Corridors and Wildlife Habitat 2009
[26] https://efiles.portlandoregon.gov/Record/15311544/

In addition, the Portland Harbor Natural Resource Trustee Council has restoration priorities that would also apply to Willamette Cove, including:[27]

- Restore natural hydrology and floodplain function
- Reestablish floodplain and riparian plant communities
- Improve aquatic and riparian habitat
- Increase habitat complexity
- Provide connectivity to other habitats in the area
- Restore recreation along the river while avoiding negative impacts to habitat

Willamette Cove is located with the Portland Harbor Superfund Site (PHSS). Since 2007 the Portland Harbor Trustee Council has been conducting a Natural Recourse Damage Assessment to address impacts from contamination in the PHSS and identifying actions to restore injured (impacted) natural resources. Natural resources include fish, wildlife, biota, air and water. These resources also provide services for human use, including recreation and cultural resource use. The Trustee Council assessed 44 sites for restoration opportunities. Willamette Cove was not chosen as a restoration opportunity by the Trustee Council; however, based on the Trustee Council assessment, it does have the potential to accomplish several of the listed restoration opportunities, such as creating complex habitats including backwater off-channel habitat. These complex habitats are preferred by juvenile salmon, lamprey and sturgeon. Tribes have maintained strong ties to these species since time immemorial, and these species have sustained many generations of tribal peoples and their cultural traditions. There is also great potential for wildlife and habitat enhancement at Willamette Cove by laying back steep riverbanks and revegetating the site with native vegetation for food and cover. In addition to direct habitat benefits, these actions would also help to reduce erosion and improve water quality.

The Portland Harbor Trustee Council has a priorities species list which is Appendix C of the Final Portland Harbor Programmatic EIS and Restoration Plan.[28] This list will be referenced during design of restoration activities at Willamette Cove.

5.2 PRIORITIZING STRATEGIC RESTORATION

It is important to prioritize restoration and stewardship activities by conservation target for several reasons. Budgetary or time constraints are likely to limit how much work can be accomplished at a given site during a given period. Successful implementation of remediation goals will drive actions and timelines. Specific actions may rise to the top due to the scarce or unique nature of a habitat type or because abating a certain threat now will save time and money in the future. Table 7 assigns priority ranking to conservation targets, followed by priority restoration and maintenance actions to achieve those conservation targets in Table 8. However, this does not mean that the other actions are not important, simply that they are not the most important actions within the next 10-15 years. These priority rankings help guide the importance and sequence of various restoration activities.

[27] https://www.fws.gov/portlandharbor/sites/portland/files/resources/FINALRestorationPlan2pager.pdf
[28] NOAA. May 2017. Final Portland Harbor Programmatic EIS and Restoration Plan. Portland, Oregon.

Table 7: Priority status for Willamette Cove conservation targets

CONSERVATION TARGET	PRIORITY
Shallow water habitat	High
Cottonwood gallery forest	Medium to High
Oak (Madrone) woodland	Medium

Table 8: Major actions needed to address threats to conservation targets within the 10-to-15-year timeframe of this SCP

HABITAT TYPE	MAJOR ACTIONS	PRIORITY	ROUGH COST	TIMING / COMMENTS
All areas	Conserve priority resources during implementation of remedial actions. Minimize threats to these resources from remedial actions.	High	TBD	During remedial action phase
Shallow water habitat	Install substrate supportive of fish and aquatic invertebrates. Remove riprap and other materials that provide poor habitat.	High	$100,000-$250,000 shared costs	During remedial action phase or in first 3 years afterward
	Install large wood and boulders within shallow water	High	TBD	During remedial action phase or in first 3 years afterward
	Plant riparian overhanging vegetation and maintain plantings	High (priority action for restoration partners)	$100,000	During remedial action phase or first 3 years afterward, with additional time to reach maturity
Riparian forest	Remove non-native/invasive vegetation including Lombardy poplar	High	$25,000	First 3 years after remedial action phase
	Increase black cottonwood canopy, especially along the river for shade and habitat connectivity by interplanting	High	$50,000	First 3 years after remedial action phase

HABITAT TYPE	MAJOR ACTIONS	PRIORITY	ROUGH COST	TIMING / COMMENTS
	Fuels management for wildland fire in consideration of neighboring properties	Medium	$10,000 Yr 1 $5k/yr thereafter	Seasonal and ongoing
	Remove competing tree species to allow sufficient light	Medium	$40,000	Years 3-6 after remedial action phase
	Enhance forest diversity and density of native vegetation with weed removal and underplanting shrubs	Medium	$50,000	Years 3-6 after remedial action phase
Oak (Madrone) woodland	Ongoing stewardship including invasive species removal and control, site prep, understory plantings, oak release, restoration maintenance, fuels management to reduce fire risk, campsite response.	High	$20,000/yr	Year 1 after remedial action phase, then seasonal and ongoing

5.3 ONGOING STEWARDSHIP PROGRAMS

The following actions represent ongoing systems or programs that are in place and practices that will be continued and/or enhanced. These actions align with maintaining the conservation targets in good or very good condition.

Stewardship

Metro's Conservation Program is committed to long-term stewardship of Willamette Cove. Metro staff will conduct regular site walks to monitor natural resource condition and public use of the natural area. As determined necessary by staff and consistent with this plan, specific treatments or actions will be implemented to ensure that the health and condition of the natural area is maintained (Table 9). Some periodic stewardship actions implemented by Metro staff include invasive species management, site visits to monitor for illegal use of the site, cleanup of illegal dumping, monitoring areas of high wildfire risk, replacing signage, and responding to complaints. Over the next few years, Metro will develop a Site Stewardship Plan to guide long-term maintenance and monitoring activities. Metro will monitor projects and restoration activities. If projects are not meeting success criteria, Metro will assess the project, and adjust as necessary. In some cases, Metro may have to revisit goals that are no longer feasible.

It is important to note that all natural resource stewardship actions will be coordinated with required remedial actions for contaminant cleanup. Monitoring in perpetuity of contaminant cleanup remediation goals may or may not be required within various habitat areas.

Table 9: High and medium priority stewardship actions over SCP period which extends from now through remedial action implementation and 10-15 years post-remedial action

ACTIVITY	FREQUENCY/DURATION	PRIORITY
Early detection of new, high-threat weeds and rapid response within riparian forest, shallow water and oak woodland	Twice-yearly	High
Campsite early detection	Monthly	Medium
Fire risk management in consideration of neighboring properties	Annually	Medium
Maintenance of signs, fences, and other infrastructure and survey for hazard trees	Annually	Medium

Invasive species management

Invasive plant species can impact the habitat values for which land is conserved. Natural lands are not fully protected unless they also are managed for the features that first motivated preservation. Invasive species can change community structure, composition, and ecosystem processes on these lands in ways that may not be anticipated or desirable. Careful management can minimize these negative impacts. Metro has initiated an early detection and rapid response program (EDRR) for invasive species including milk thistle, knotweed, and spurge laurel which have been documented in the area. Invasive species will be controlled by hand pulling or herbicide application as they are detected in the natural area. Other invasive plant species will be controlled as part of restoration projects or ongoing management of habitat areas. See Appendix A.4 for a list of invasive species.

5.4 LONG-TERM STRATEGIES

The following actions may be necessary to achieve the long-term goals of this site conservation plan but are not identified as priority actions during the time of this plan.

- Long-term vegetation management.
- Work with Portland Parks and Recreation in partnership with North Portland Greenway for trail installation.
- Partnerships with key partners including the Tribes and community members for long-term stewardship within Willamette Cove.

5.5 MONITORING FRAMEWORK

Monitoring at Willamette Cove will be an integral part of an adaptive management approach to restoration and stewardship. Based on the monitoring plan developed by Metro, a feedback loop is created between monitoring and management decisions. Monitoring will be done to evaluate habitat, population responses to management action, as well as progress toward achieving habitat and population objectives.

In addition to standard practice of monitoring for adaptive management within our conservation program, there will also be projects developed and implemented in order to monitor remedial actions. These actions will be required as a part of the contaminant cleanup oversight at Willamette Cove for the upland and in-water areas.

The monitoring strategy is based on threats and key ecological attributes associated with conservation targets. Monitoring addresses threats directly and indirectly by tracking changes in certain ecological attributes. It implements techniques that are well-established and continues many monitoring efforts already in place.

Monitoring techniques

Some monitoring techniques are used to monitor multiple habitats within a nature park or natural area, with a focus on measuring key ecological indicators to achieve conservation targets. This discussion is intended to provide a general introduction but not detailed methods.

Remote sensing/GIS. Several metrics are used for the health of conservation targets related to woodland cover and habitat size. Where a desired condition is a minimum canopy cover, it can be estimated with GIS software using current aerial photography. Similarly, important connections within the natural area and to off-site habitat can be inspected with aerial photographs.

Transects. Transect surveys involve the use of lines or strips of ground along which measurements are made of plant species presence or absence. Permanent transects can be installed and tracked over the years to track progress toward goals. They are useful in tracking the cover and composition of native plants and invasive species in oak-madrone and riparian forest habitat areas.

Site walk. Ocular (visual) estimates can be used to determine the presence or absence of a species within a short timeline and at a very low cost. This method of monitoring is typically used to determine intervals for treatments or success of a planting when managing projects.

Photos. Permanent photo points are established to provide long-term documentation of changes to habitats over time. Typically, photo points are marked by a permanent landscape feature or metal stakes and photos are taken at a landscape scale over long-term periods of time.

Avian point count station monitoring. Point count station monitoring is a common way to monitor bird populations. It is characterized by tallying all birds observed at fixed locations during specific, repeated observation periods.[29]

Waterfowl and wading bird monitoring. This form of assessment and inventory work involves tracking the habitat quality and restoration effectiveness of wetlands and shallow water habitat using wading birds as bio-indicators.

Shallow water fish and invertebrate monitoring – various techniques. Multiple monitoring methodologies can be utilized within the shallow waters of Willamette Cove. For juvenile fish, radio

[29] Huff, Mark.; Bettinger, Kelly A.; Ferguson, Howard L.; Brown, Martin J.; Altman, Bob. 2000. A habitat-based point-count protocol for terrestrial birds, emphasizing Washington and Oregon. Gen. Tech. Rep. PNW-GTR-501. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

telemetry, snorkeling, electrofishing and beach seines are often used. For invertebrates, radio drift nets, multiple-plate samplers, and grab samplers can work well.

Conservation targets and monitoring techniques

Shallow water habitat. Annual site walks and visual monitoring of site conditions will be used to monitor this conservation target. Monitoring by boat or aerial photo may also be used to monitor substrate, large wood, and other features. Other monitoring work may be conducted before and after any restoration actions. Fish presence/absence surveys may be conducted in collaboration with ODFW. Aquatic invertebrate studies may be conducted to provide information about forage availability and diversity of habitat.

Riparian forest. Annual site walks and visual monitoring of site conditions will be used to monitor this conservation target. Site-specific plant monitoring, as needed, will be planned with the site team, with input from the plant scientist. Baseline avian monitoring data will be collected for a minimum of two years prior to any restoration work, followed by seven years post initiation. Long-term maintenance can be supported by avian monitoring every three years. Other wildlife species assessment work can be conducted seasonally before and after any restoration actions including terrestrial invertebrate studies to provide information about forage availability and diversity of habitat.

Oak (Madrone) woodland. Annual site walks and visual monitoring of site conditions will be used to monitor this conservation target. Baseline avian monitoring data will be collected for a minimum of two years prior to any restoration work followed by seven years post installation. Long term maintenance can be supported by avian monitoring every three years. Other wildlife species assessment work can be conducted seasonally before and after any restoration actions.

Table 10: Habitat monitoring actions

HABITAT	MONITORING ACTIVITY (TECHNIQUES)	FREQUENCY/DURATION	PRIORITY
Shallow water habitat	Remote sensing, boat survey, habitat assessments	Annually for a minimum of ten years	High
Riparian forest	Visual monitoring, site walks	Annually for a minimum of seven years post initiation of restoration	Medium
Oak (Madrone) woodland	Visual monitoring, site walks	Annually for a minimum of seven years post initiation of restoration	Medium

Table 11: Habitat monitoring actions to determine key ecological attribute status and assess existing and new threats

HABITAT	MONITORING TECHNIQUES TO MEASURE KEA CONDITIONS	FREQUENCY/DURATION	PRIORITY
Shallow water habitat	• In general: Annual site walks to determine general condition and identify potential issues; remote sensing • Substrate condition: estimate via aerial inspection, e.g., a drone • Water depth: depth measurements via wading or by boat • Underwater refugia: estimate via aerial inspection, e.g., a drone	Annually for a minimum of ten years	High
Riparian forest	• In general: Annual site walks to determine general condition and identify potential issues; remote sensing • Vegetative structure, understory: visual or more formal estimates (such as quadrats) of percent combined cover, photo points • Vegetative structure, overstory: visual or more formal estimates of forest canopy • Canopy gaps: site walks and aerial photos	Annually for a minimum of seven years post initiation of restoration	Medium
Oak (Madrone) woodland	• In general: Annual site walks to determine general condition and identify potential issues; remote sensing • Native grass and forb abundance: quadrat or similar quantitative sampling tool • Canopy cover and architecture of woody vegetation: visual estimates	Annually for a minimum of seven years post initiation of restoration	Medium

SECTION 6: SITE MASTER PLANNING AND ACCESS

In December 2020, Metro Council passed a resolution to make Willamette Cove eligible for funding through the 2019 Parks and Nature bond. Included in the resolution was an affirmation of Metro Council's support of and commitment to explore trail development, habitat restoration and a broad range of passive recreational activities at Willamette Cove.

The site master plan will create a holistic vision for Willamette Cove Nature Park. The nature park design will address but not be limited to

- Site entry, facilities, and parking
- North Portland Greenway connection
- Fish and habitat restoration, creation, and preservation, incorporating the priorities and strategies of this Site Conservation Plan
- Water access (viewing and other uses)
- Trailhead and trails
- Cultural elements and interpretation
- Art and signage

Presently, public access to Willamette Cove is prohibited by Metro following the 2013 Oregon Health Authority health consultation. High levels of lead and dioxin addressed in the health consultation will be addressed through upland remediation design and action, but it is likely that some low-level contamination may remain in certain areas that will be considered at safe levels for humans, wildlife and plant. These areas will be considered during the site master planning process regarding appropriate public access.

The site's 3,000 feet of shoreline will be considered in a public access context within the larger conversation of Portland Harbor Superfund contamination and cleanup, as well as the high priority habitat and restoration potential here. The river property below the ordinary low water line is DSL ownership necessitating collaboration among the public agencies, Tribal partners as well as many other community partners. Metro is working with in-water parties (DSL, Port of Portland and City of Portland) to discuss opportunities for habitat creation, restoration and water access. During the site master planning process, access to the river as well habitat enhancement will be considered based on the Tribes and community input.

It is also important to point out that much of the inner cove, often occupied by boats moored outside of the Metro ownership boundary, is outside of Metro's management scope. However, the use of the inner cove directly affects Metro's managed land due to boaters' continued access of the beach and will be considered during site master planning efforts. The site master plan is a vision for Willamette Cove and will have to be adopted by Metro Council. After adoption the design, engineering and construction documentation for Willamette Cove Nature Park will begin.

6.1 FUTURE PUBLIC ACCESS AND USE

Future public access and use to Willamette Cove as well as planning and installation of the North Portland Greenway Trail segment will be part of the site master planning process and future design documentation. A multi-use trail alignment through Willamette Cove site is shown of the City of Portland's Comprehensive Plan from 1988 and is part of the regional trail plan adopted by Metro in 2003. Map 2 shows the conceptual location of the regional trail. This trail segment is part of a longer Willamette River Greenway, which was adopted in Oregon's Statewide Planning Goals and Guidelines in 1973.

Thoughtful consideration will go into the balance of access and conservation of the natural resource areas. The nature park will have site access in the form of trails. During the design phase, the balance of habitat and trails will be planned, where trails will be intentionally located for access. In some areas, depending on the conservation goal, fencing may be planned to control access. Other uses at Willamette Cove may include water access. Water access will be a part of the master planning process and could take the form of a beach, non-motorized boat ramp, or an overlook. These features and activities will be planned and designed within conservation goals parameters to balance habitat and access. Other potential opportunities and constraints that will be discussed during master planning include the natural area experience, local recreational demand, resource impacts, remediation-driven requirements, railroad right-of-way access, land use and development permit requirements, long-term operations and maintenance, as well as capital development and maintenance funding.

6.2 PROGRAMMATIC EDUCATION, CULTURAL USE AND VOLUNTEERS

In addition to meeting conservation goals, Metro's regional parks and natural areas were created to give residents within our region opportunities to enjoy, experience, participate in and understand the natural world. Conservation education staff at Metro work with underserved communities, schools, civic organizations, and the public to provide nature programs that thoughtfully connect people to Metro's parks and natural areas. Schools and civic groups who are interested in programs contact Metro to request a program. Public walks are advertised in Metro's quarterly "Big Backyard" publication. Information about conservation education programming is also available on Metro's nature education website.

Education program

Willamette Cove has the potential to host a wide variety of conservation education programs. Metro believes that connection to land promotes joy and wellbeing and nurtures a sense of belonging, reciprocity and generosity. The nature activities offered by Metro's community education and stewardship team are designed to be collaborative, safe and welcoming.

Cultural Use

Metro's Cultural Resource Use Permit, CRUP, allows the agency to support Tribes, tribal members and urban Indigenous community members to in accessing the parks and natural areas that Metro stewards on behalf of the public. The CRUP process can support access and activities that may include cultural events, culturally significant plant material harvesting or utilizing a Metro park or natural area for ceremony space.

The CRUP gathers information to help Metro to check on potential conflicting site uses, to coordinate providing resources and support if requested, and to potentially close the site to the public uses during the requested time where possible so that Tribes, tribal members or urban Indigenous community members can safely access Metro's sites. Metro will collaborate with interested Tribes to explore future cultural uses at Willamette Cove and programmatic intergovernmental agreements which may be able to support these activities.

Volunteer program

The primary goal of the volunteer program is to provide a variety of high-quality, meaningful volunteer opportunities that help the community build connections to nature, learn about our program, and add value and capacity to Metro's work. Through these opportunities, community members can learn about, appreciate, and enjoy Willamette Cove at a future time when it is safe to do so, work alongside fellow community members, learn new skills, or polish existing ones and gain the satisfaction of contributing to the long-term health and livability of their communities.

Community stewardship and science volunteers

Due to its location within the city limits of Portland, Willamette Cove provides a unique opportunity within Metro's nature park and natural area system to include many community members, particularly those for whom the close-in urban location works well. The site itself, with small and varied habitats, could host multiple stewardship projects for all ages once safe to do so. From an easily accessible meadow for planting camas and other First Foods, to the riverbank of riparian forest and oak–madrone woodland, this site has the potential to serve as a living field laboratory for conservation stewardship and study with interested partners such as tribal members and community members and stakeholders.

Metro's volunteer wildlife monitoring program provides valuable information about Metro's nature parks and natural areas while offering a unique and in-depth service opportunity for community members. By focusing on indicator species such as birds and other animals, volunteers provide data to help Metro's Science and Land Management teams gauge the progress of restoration efforts and track the effects of public use on wildlife. Due to Willamette Cove's unique location and history, there will be thoughtful consideration and outreach for interested partners and groups wishing to have community science opportunities such as this type of monitoring.

6.3 SITE MANAGEMENT

Metro's management of the site will include enforcement of the posted rules to provide protection for wildlife and water quality, and to protect the safety and enjoyment of any person visiting these facilities.

Special use permits

Special use permits are required for certain regulated and non-traditional uses of parks and natural areas to ensure public health and safety and to protect natural resources, properties and facilities owned or managed by Metro. Special use permits are required for commercial film, video or photography; educational activities or educational events; festivals and organized sports activities;

use of amplified sound; equipment or other elements potentially posing a safety threat or public nuisance; concession services; site restoration or alteration, biological research, scientific collection (soil, wildlife or vegetation disturbance of any kind); any organized activity, event or gathering involving 25 or more people. Metro's tribal liaison and the Parks and Nature Indigenous community liaison are available to help coordinate requests for special use of the site by interested Tribes, tribal-serving organizations or Indigenous community members.

Archeological resources

Due to Willamette Cove's location along the Willamette River as well as proximity to the Columbia River, pre-contact and contact era historic human activity at the site has been assumed. During contaminant investigation work over the past two decades, considerations of potential archeological resources have been included. Inadvertent Discovery Plans (IDP) have been developed for sediment sampling and projected remediation efforts. If during any future site investigation, alteration or improvement an archaeological resource is discovered, Metro will implement the site IDP and involve the appropriate Tribes and the State Historic Preservation Office to determine appropriate next steps in Metro's activities. If any damage or unlawful use is identified, Metro will notify the Multnomah County Sheriff and State Historic Preservation Office (SHPO) to determine appropriate next steps including investigation and notification to Tribes.

Dogs

One of the most difficult management issues for public access is the introduction of dogs by visitors. Research shows that even if dogs stay on the trails, they are perceived as predators by wildlife. The zone of influence of a dog, even on leash, can be several hundred feet on either side of a trail. Because of the potential disturbance to wildlife and wildlife habitat, dogs are not allowed in any Metro natural area, with the exception of leashed dogs being allowed within the confines of the future North Portland Greenway Trail segment that will be located on the riverbank side of the Union Pacific Railroad tracks. Educational signage, self-policing, and strict enforcement are all needed to effectively manage this sensitive issue.

Signage

Regarding planned public access, a sign plan would follow as part of the design and development process. In the interim, regulatory signs at known entry points should be installed to alert the public to the level of access currently provided at Willamette Cove. In addition, signage pertinent to contaminant remediation work will remain and be updated/modified, as needed.

Any future signage developed for the natural area should utilize Metro's current brand and signage standards manual. The manual establishes a graphic standard that will be integrated into the entire signage plan. The manual addresses each of the three sign types: regulatory, wayfinding and interpretive.

6.4 STRATEGIC ACTIONS (ACCESS AND SITE MANAGEMENT)

The following actions describe the proposed access and site management improvements over the life of this plan. The projects were established as part of the development of this plan.

Signs

Regulatory and information signs will be installed, including natural area rules, maintenance road/fire lane identification and sensitive habitat signs. Signs will be placed at strategic locations throughout the natural area.

6.5 BEYOND FIVE YEARS OR AS NEEDED

There has been and will continue to be increased demand to access and recreate at Willamette Cove. Future access improvements will need a more in-depth analysis of opportunities and constraints for trails and public access, including meetings with partners, neighbors and the public and developing a detailed master plan.

SECTION 7: COORDINATION

The conservation plan has laid out the history and context of Willamette Cove, along with the conservation, management, and public access projects for the next ten years. For those projects to be realized, coordination will be needed on several fronts. Important coordination points include:

- Site master planning process.
- Balancing future public access with any institutional controls post-remediation along with desired habitat improvements.
- Monitoring restoration efforts to track effectiveness and make changes to the priorities and goals, as needed.
- Coordinating and collaborating with the Tribes
- Engagement with community collaborators.
- Funding to realize the strategic restoration and access actions identified in this plan.

7.1 TRIBAL ENGAGEMENT AND PUBLIC INVOLVEMENT

As projects and restoration plans are developed, Metro is committed to working closely with key partners including Tribes, community members and stakeholders including urban Indigenous community members and other neighbors and community groups, both local and regional, providing pertinent information about the remedial actions for cleanup before and during implementation.

Metro will have two engagement processes for the site master planning, that includes tribal engagement and community and public engagement.

Tribal Engagement

Metro has prioritized engagement with the six Tribes who are involved in the Portland Harbor Superfund Site, including, alphabetically: Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation of Oregon and the Nez Perce Tribe. Metro's engagement with the Tribes in the Willamette Cove project is distinct from ongoing formal federal consultation that is part of the broader Portland Harbor Superfund Site with the Tribes. Engagement with the Tribes will focus on tribal priorities for future habitat restoration at the site, priorities for future passive recreational opportunities, future implementation planning, and has previously focused on considerations for the DEQ-authorized Contingency Remedy at Willamette Cove. Metro welcomes further engagement with any interested Tribes on topics in addition to those identified here regarding Willamette Cove.

Tribal engagement will be ongoing throughout the site master planning process, design and construction documentation, and future restoration planning for Willamette Cove. During this process, if there are substantive changes or suggestions to planned habitat restoration actions, Metro will coordinate with the Tribes. Metro staff propose to engage with the Tribes prior to community and public engagement wherever possible.

Community Engagement

Metro Council directed staff to prioritize the engagement of communities who have not benefitted equitably from previous Metro investments and ensure they have a meaningful impact on the decision-making process for the development of the site master plan. These communities include the Black community, Indigenous community, people of color, low-income community members, people living with disabilities, immigrant communities, people experiencing houselessness and other marginalized groups.

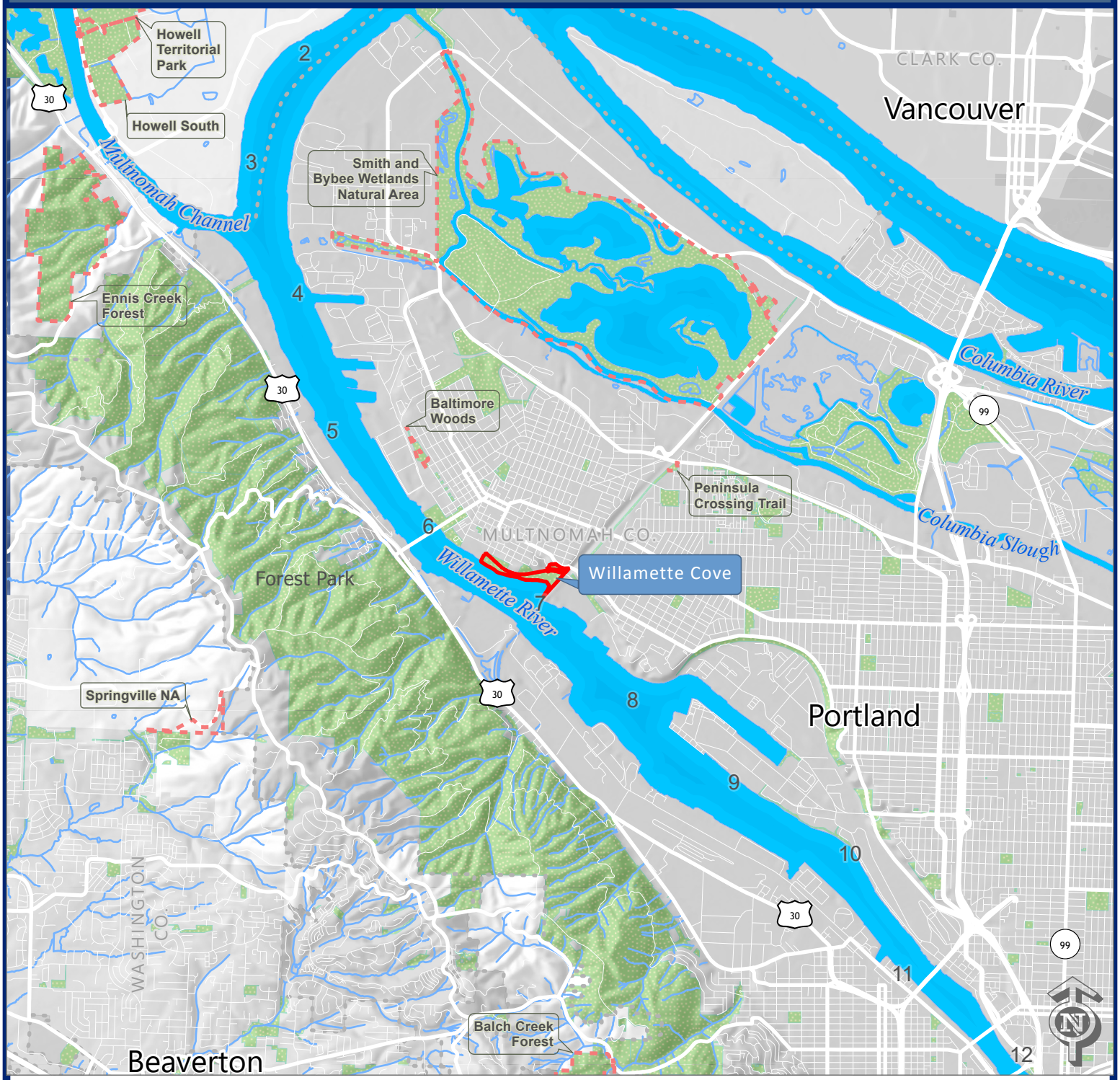
For each phase of the master planning process, after the Tribes review and comment on the issues in that phase, Metro will work with these communities and the wider community to shape the master plan.

Metro will also include additional stakeholders in engagement processes. These professional stakeholders include conservation organizations, advocacy groups, neighborhood associations, local schools, the University of Portland, trail advocacy groups and others.

MAPS

MAP 1: VICINITY MAP

Metro



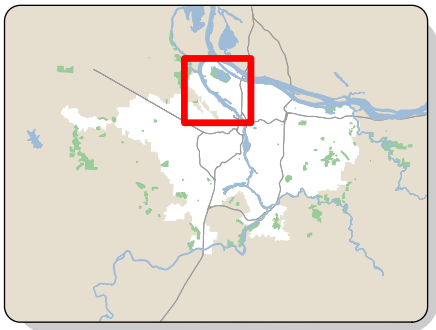
Willamette Cove site

Other Metro sites

Parks and/or Natural Areas

\# Willamette River Miles (distance to Columbia River)

0 1.5 3 Miles



MAP 2: SITE MAP

Metro

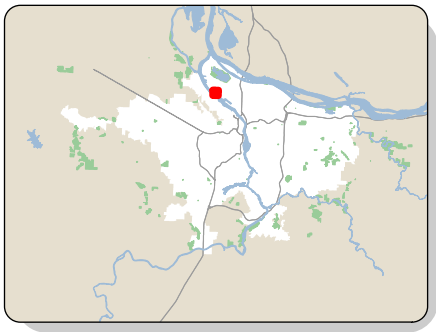
Willamette Cove site

Existing Regional Trail

Planned Regional Trail

Conceptual Regional Trail

0 800 1,600 Feet



Willamette Cove Site Conservation Plan

map date: 8/24/2023

MAP 3: CURRENT COVER

Metro

- Willamette Cove site
- Shoreline
- Developed - (impervious)
- Developed - (pervious)
- Woodland - oak
- Woodland - other
- Undesirable cover/weeds

0 600 1,200 Feet

map date: 8/28/2023

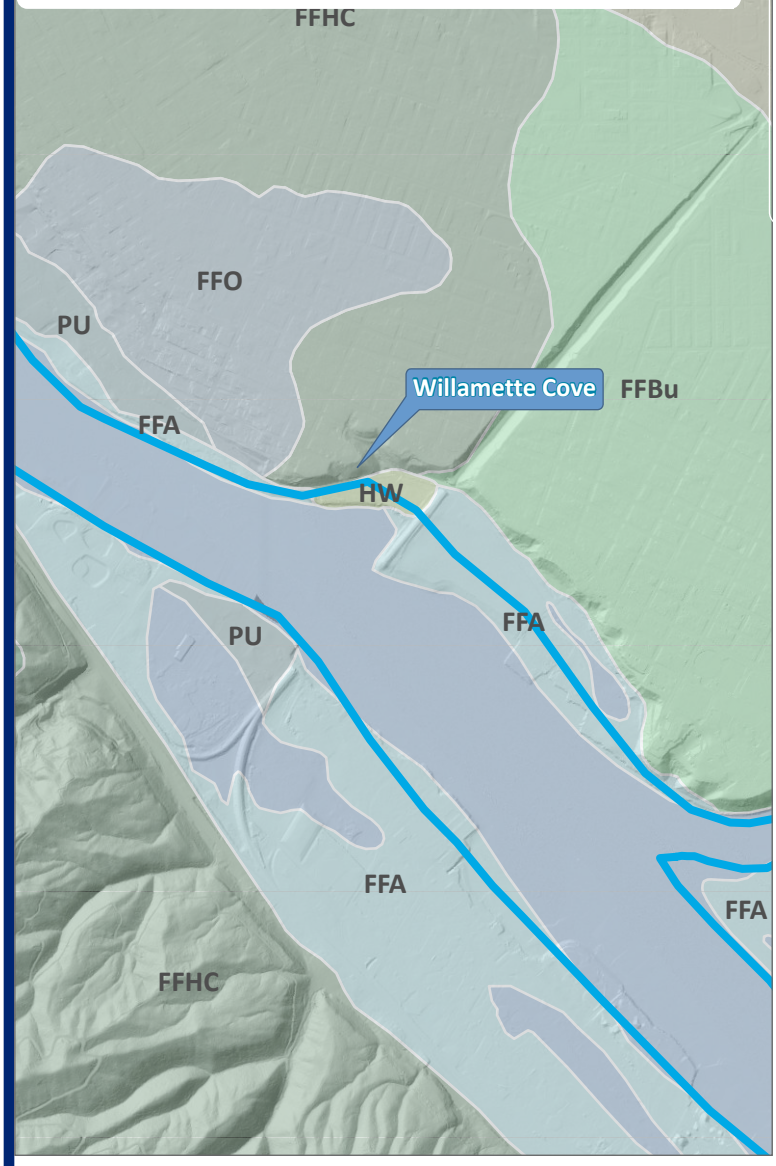
MAP 4: HISTORICAL VEGETATION & GLO SURVEY

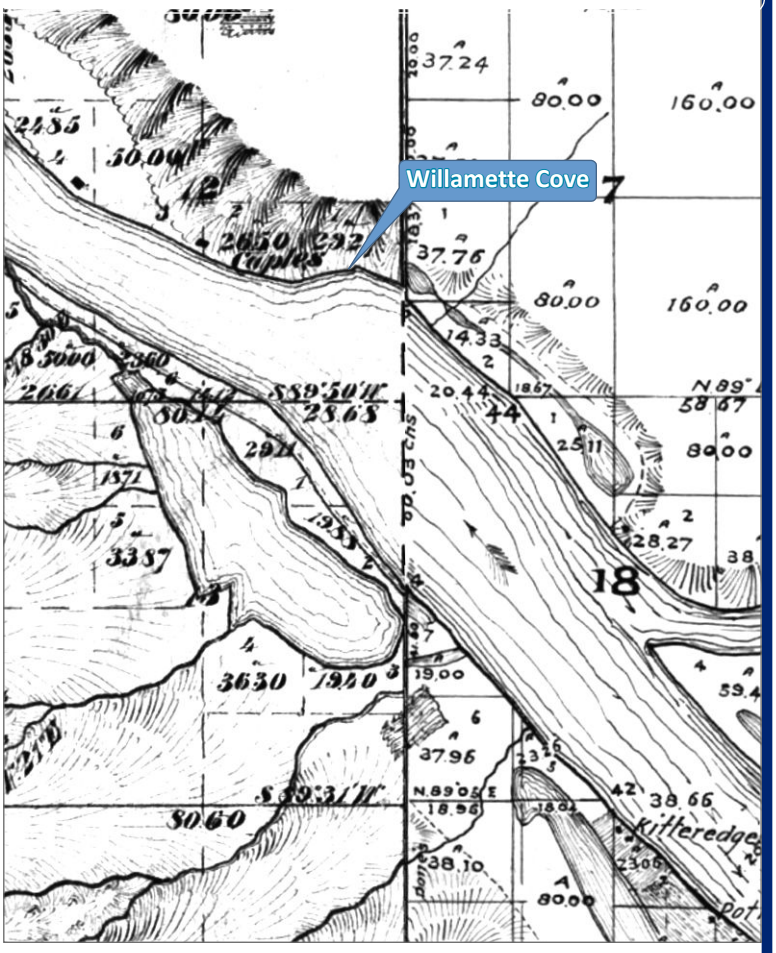
Metro

This polygon coverage depicts historical vegetation in the Willamette Valley, Oregon, and portions of the Columbia River floodplain in Oregon. It is based on land survey data recorded by General Land Office (GLO) surveyors between 1851 and 1910, including township and section line data.

The coverage was created to identify the types of vegetation present historically and to quantify their extent at the time of survey. In most cases, vegetation present at the time of survey is a close approximation of vegetation prior to widespread changes wrought by Euroamerican settlement.

This map is the 1852 public land survey of the Portland, OR region. The United States General Land Office (GLO) was established by the Treasury Department in 1812, which grew out of the Land Ordinance of 1785. The GLO was responsible for the disposal of public lands throughout the nineteenth century. The US Government required that Public Lands be first surveyed prior to settlement. Thomas Hutchins, the first director of the G.L.O. was instrumental in establishing the rectangular public land survey system. This system divided the land into square six-mile blocks, which were then further subdivided into sections and quarter sections. Ohio was the first "test" state that this system was used on. The GLO used standardized symbols to represent geographic features. In addition the surveyors were required to indicate cultural features such as roads and Indian trails. Departing from contemporary mapping practice, field surveyors were ordered not to furnish new names for landscape features but to retain "the received names of all rivers, creeks, lakes, swamps, prairies, hills, mountains and other natural objects." After Ohio the surveyors went west and south, reaching the Mississippi River around the 1850's. In 1803 Jared Mansfield instituted improvements and refinements in the rectangular survey system. He introduced the use of principle meridians and parallels of latitude. These refinements greatly sped up the mapping process. The efforts of the U.S. General Land Office greatly helped other mapmakers, who used these maps for reference in constructing their own maps. The GLO mainly published state maps, which came out in separate volumes each year bound in atlases. Many of these original GLO state maps were destroyed and they are generally hard to come by today.





Representing the approximate river bank based on GLO survey contours

Historical vegetation

- FAW - Closed forest; Riparian & Wetland
- FF - Closed forest; Upland
- FFA - Closed forest; Riparian & Wetland
- FFBu - Closed forest; Upland
- FFHC - Closed forest; Upland
- FFHCBu - Closed forest; Upland
- FFO - Closed forest; Upland
- HW - Shrubland
- PU - Prairie
- PW - Prairie

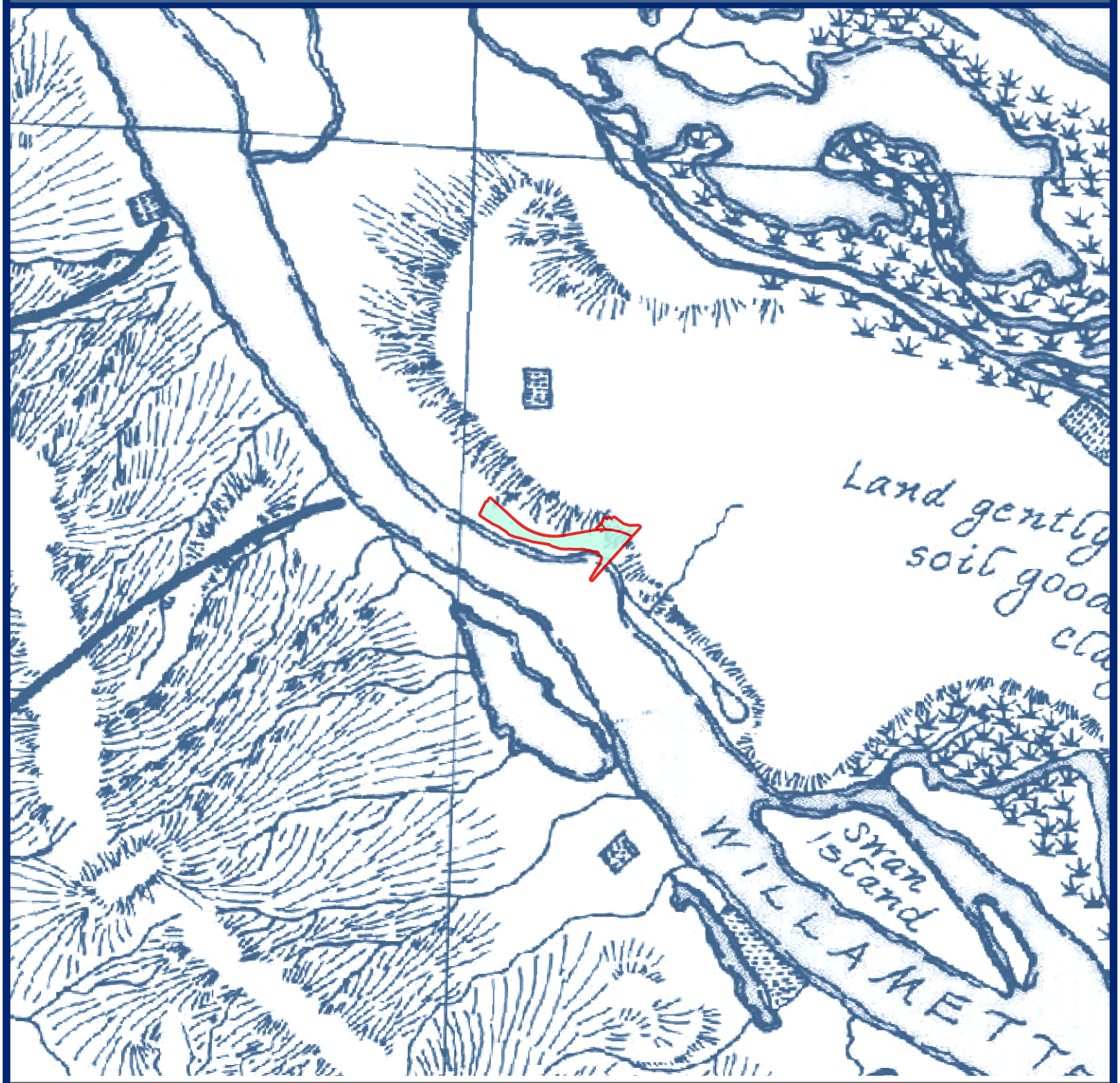
*** Labels refer to vegetation subclasses.**

0 2,500 5,000 Feet

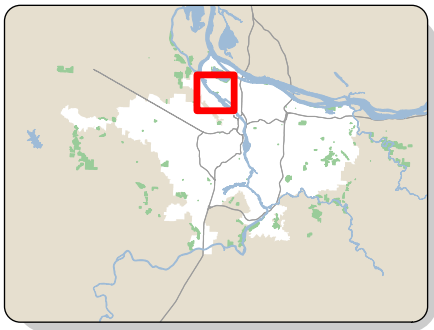
MAP 5: GENERAL LAND OFFICE (GLO) MAP

This map is the 1852 public land survey of the Portland, OR region.

Metro



Willamette Cove site



0 0.9 1.8 Miles

MAP 6: TOPOGRAPHY

Metro

Willamette Cove site

10 ft contour

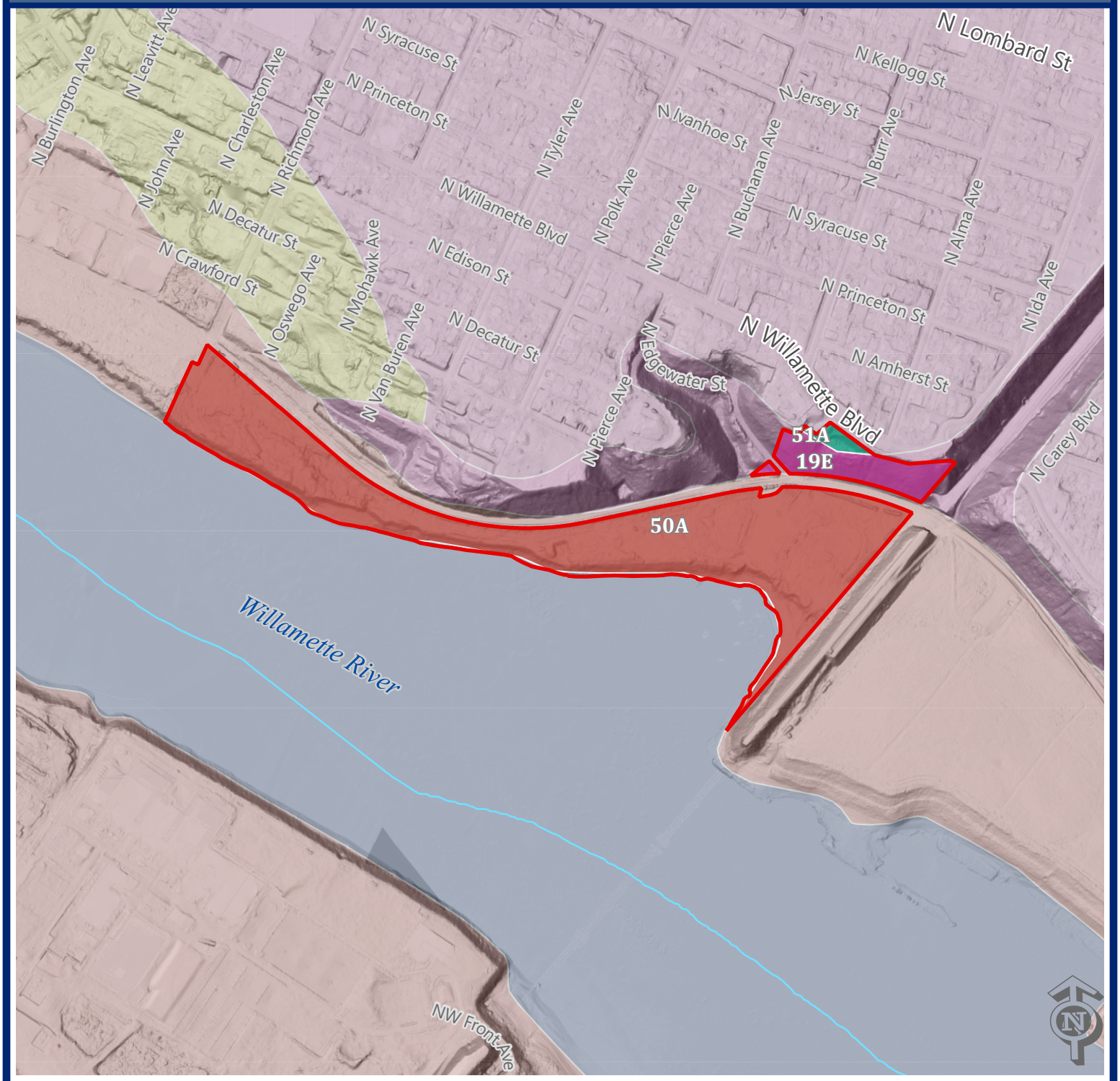
50 ft contour

0 1,000 2,000 Feet

map date: 8/23/2023

MAP 7: SOILS

Metro



Willamette Cove site

19E - Haploxerolls, steep

50A - Urban land, 0 to 3 percent slopes

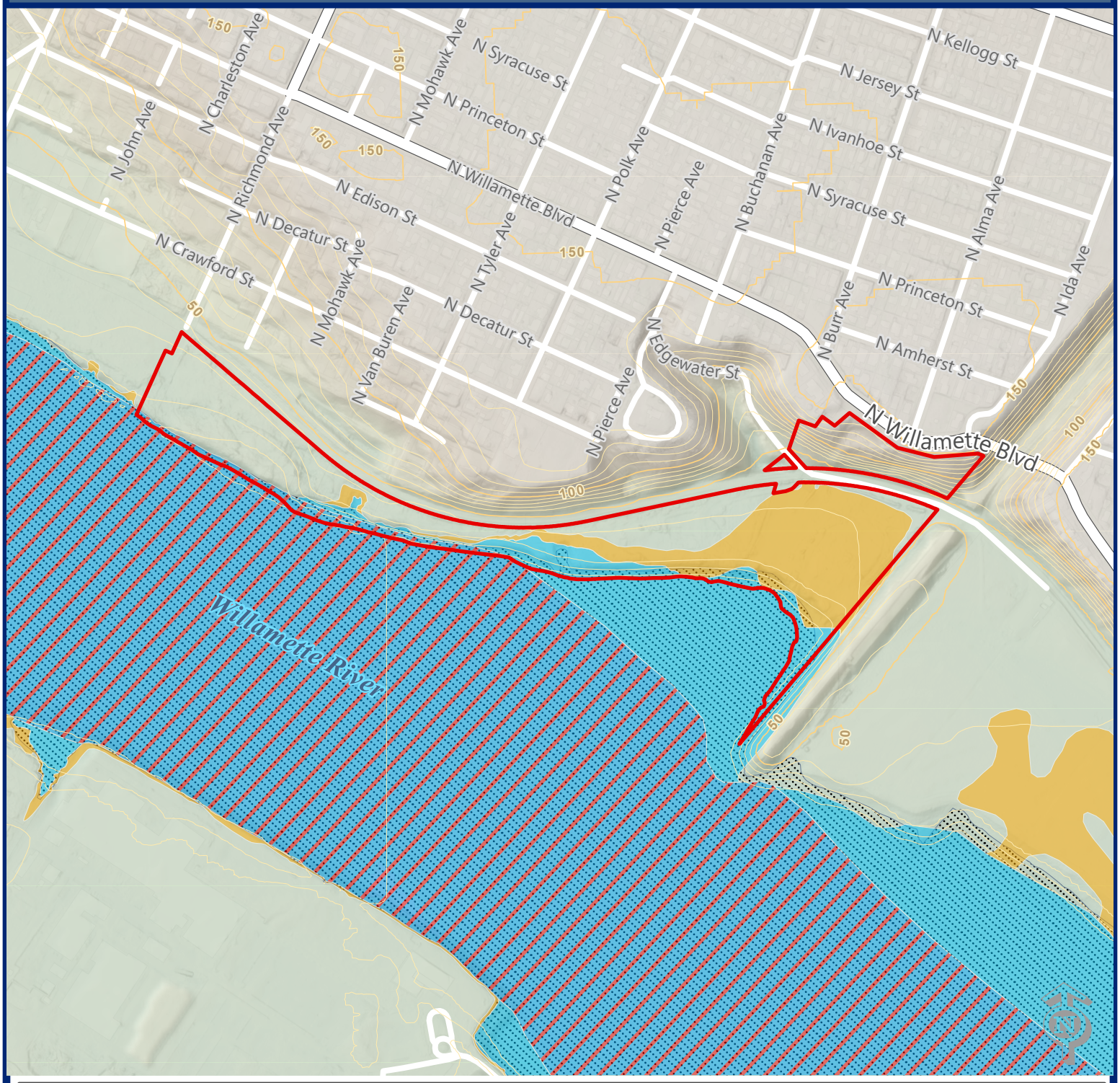
51A - Urban land-Latourell complex, 0 to 3 percent slopes

0 790 1,580 Feet

map date: 8/24/2023

MAP 8: HYDROLOGY

Metro



Willamette Cove site

Flood 1996 - Metro

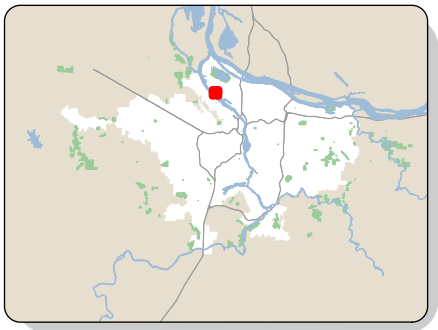
Flood Plains (FEMA)

1% Annual Chance Flood Hazard

Regulatory Flooodway

0.2% Annual Chance Flood Hazard

0 500 1,000 Feet



MAP 9: CONSERVATION TARGETS

Metro

- Willamette Cove site
- Oak woodland
- Riparian forest
- Shallow water habitat
- No targets

0 600 1,200 Feet

Willamette Cove Site Conservation Plan

map date: 11/13/2023

APPENDICES

APPENDIX A-1 | CONSERVATION TARGETS

INTRODUCTION

Conservation targets are composed of a suite of species, communities and ecological systems that represent and encompass the full array of native biodiversity of the site, reflect local and regional conservation goals, and are viable or at least feasibly restorable (The Nature Conservancy 2007). Priority conservation targets represent species or habitats that are the conservation focus for a given area or management unit.

Conservation targets establish the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. They are the foundation of conservation planning. Key ecological attributes (KEAs) for each conservation target will be evaluated. KEAs are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). Viability of the conservation target is inferred by the condition of the KEAs. Analysis of threats affecting conservation targets inform the development of action plans to abate serious threats and monitoring plans to gauge success of the action plans. Conservation targets then should consist of species or communities that will provide the focus of management actions and monitoring. Species or communities that for whatever reason are too expensive to manage or monitor are not good candidates for conservation targets.

BACKGROUND

Historically, the Willamette Valley was dominated by extensive prairie, riparian forest, oak savanna and woodland habitats totaling approximately two million acres that supported a wide diversity of plant and animal species, including several endemic to the Willamette Basin (Floburg et al 2004). These habitats were primarily maintained by Native American-ignited fires. Agricultural and residential development in the Willamette Subbasin and the cessation of widespread prescribed fires has resulted in a substantial loss of native habitat especially at the lowest elevations, leaving less than two percent of all historic prairies and seven percent of oak habitat present today.

The Willamette River historically provided a critical migratory corridor and rearing habitat for salmon and steelhead, including runs of now endangered steelhead and chinook, as well as numerous other species that require a functional river system to migrate, live and thrive. These animals and plants include, but are not limited to[1]:

- mink and river otter
- migratory birds, including osprey, bald eagle, belted kingfisher, mergansers and other waterfowl
- great blue heron, spotted sandpiper and other shorebirds
- anadromous and resident fish, including salmon, lamprey and sturgeon
- reptiles and amphibians

[1] NOAA. February 2017. Final Portland Harbor Programmatic EIS and Restoration Plan. Portland, Oregon.

- aquatic invertebrates
- wapato and other aquatic plants
- oak and madrone within the bluffs along the river

The river provides essential ecosystem services which are crucial for these species – opportunities for food, shelter, and the successful rearing of young. Restoring functional habitat in the shallow waters and riverbank at Willamette Cove will contribute towards a healthy return of these services for the species that need and value them, including humans.

The Lower Willamette River holds great importance to several tribes as a natural and cultural resource. Loss of ecological in and around this portion of the river from historic industrial activity halted traditional uses. Restoration of these functions has been a priority of the Portland Harbor Natural Resource Trustees throughout the Portland Harbor Superfund investigation and remediation planning process. [2]

In addition, due to its unique location along the river, Willamette Cove is of great interest to the public close within Portland and throughout the Portland metropolitan area seeking access to nature close to the Willamette River shoreline.

Bringing balance to the river within the context of the urban environment through which it flows requires collaboration and good science. For this site conservation plan, we have focused on conservation targets that we hope will support the habitat conservation needs for this area within the Lower Willamette River.

METHODS

Local and regional conservation plans were referenced to identify the conservation targets of the Willamette Cove Natural Area Site Conservation Plan (see Table 1). These plans included the City of Portland River Plan, Portland Harbor Restoration Plan, the Northwest Power and Conservation Council's Willamette Subbasin Plan (NWPCC 2005), and Partners in Flight's Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington (Altman 2000). These plans identify both focal habitats and focal species as conservation targets.

[2] NOAA. 2020. Portland Harbor Final Supplemental Restoration Plan and Environmental Assessment. Portland, OR. March 2021.

RESULTS

Using onsite habitat types and conservation planning efforts as guides, conservation targets were selected that encompass the site's most threatened biodiversity values as well as regional conservation targets (Table 1). The site's three conservation targets were identified as

- Shallow water habitat
- Cottonwood gallery forest
- Oak-Madrone woodland

While not elevated to the level of "conservation targets," certain wildlife species that depend on shallow water habitat, cottonwood gallery forest and oak woodland must be considered within the habitats' key ecological attributes. These species are either already rare or declining, and implementing specific management practices may aid their conservation. Representative species within their associated habitat selected as a conservation target are listed in Table 1.

Table 1: Willamette Cove identified conservation targets and representative species[3]

CONSERVATION TARGET	REPRESENTATIVE SPECIES			
Shallow water habitat	Trout, salmon and lamprey: rearing habitat and refugia	Mink	River otter	Spotted sandpiper
Cottonwood gallery forest	Tree swallow	Cooper's hawk	Bullock's oriole	Little brown myotis
Oak-Madrone woodland	Bushtit	Western wood peewee	Slender-billed nuthatch	Downy woodpecker

[3] Partners in Flight's Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington (Altman 2000)

APPENDIX A-2 | KEY ECOLOGICAL ATTRIBUTES

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution, or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. For each KEA, one or more indicators were selected to assess the health of the KEA.

Indicators are measurable entities related to the condition of the KEA (The Nature Conservancy 2007). A good indicator should be:

- **Biologically relevant:** The indicator should represent an accurate assessment of target health.
- **Sensitive to anthropogenic stress:** The indicator should be reflective of changes in stress.
- **Measurable:** The indicator should be capable of being measured using standard procedures.
- **Cost-effective:** The indicator should be inexpensive to measure using standard procedures.
- **Anticipatory:** The indicator should indicate degradation before serious harm has occurred.
- **Socially relevant:** The indicator's value should be easily recognizable by stakeholders.

KEA indicators were categorized by type: size, condition or landscape context:

- **Size:** A measure of the area or abundance of the conservation target's occurrence.
- **Condition:** A measure of the biological composition, structure and biotic interactions that characterize the occurrence.
- **Landscape context:** An assessment of the target's environment including ecological processes and regimes that maintain the target occurrence such as flooding, fire regimes and many other kinds of natural disturbance, and connectivity such as species targets having access to habitats and resources or the ability to respond to environmental change through dispersal or migration.

The status of an indicator will vary over time either within an acceptable range of variation that sustains the conservation target or beyond a critical threshold that threatens the viability of the conservation target. The range is described as very good, good, fair, or poor. The very good and good ratings mean that the indicator is functioning within its acceptable range of variation. Fair and poor ratings mean an indicator is outside its acceptable range of variation. When information was lacking to define all four categories then only a subset of the four categories was defined.

Definitions for the four categorizes follow those used by The Nature Conservancy:

- **Very Good:** The indicator is functioning within an ecologically desirable status, requiring little human intervention for maintenance within the natural range of variation (i.e., is as close to "natural" as possible and has little chance of being degraded by some random event).
- **Good:** The indicator is functioning within its range of acceptable variation, although it may require some human intervention for maintenance.
- **Fair:** The indicator lies outside of its range of acceptable variation and requires human intervention for maintenance. If unchecked, the target will be vulnerable to serious degradation.
- **Poor:** Allowing the indicator to remain in this condition for an extended period will make restoration or prevention of extirpation of the target practically impossible (e.g., too complicated, costly and/or uncertain to reverse the alteration).

KEAs and their indicators for Willamette Cove Natural Area's conservation targets are provided in the following tables. References are at the end of the KEA tables.

Table 1. Key ecological attributes for Shallow Water Habitat at Willamette Cove. These Key Ecological Attributes are based on substrate, water depth and underwater refugia because these are variables that can potentially be positively affected by habitat management within the approximately 10-year lifespan of this document. These variables should be measured during the month of May. We excluded the following variables because habitat management cannot substantially affect them except for creating new shallow water habitat: water velocity, dissolved oxygen and food availability.

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT STATUS	DFC* FOR THIS SCP	LONG-TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Size (see comments in last column)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	High quality shallow water habitat along the North Reach of the Willamette River is a critically important conservation target for multiple fish species including juvenile Coho and Chinook Salmon, Lamprey, and to a lesser extent, other native fish species. Even small patches of shallow water habitat are important. It is currently unclear whether size is as important as condition. Currently we have no basis to establish goals or size rankings; desired extent will be a joint decision with partners. However, this site hosts up to 3,000 linear feet of shoreline along which shallow water habitat could be restored.
Condition	Substrate (excluding dead wood or other cover structure)	Proportion of fine sediment cover (sand, silt, mud, small organic sediments)	<25% cover of shallow water area	25-50% cover of shallow water area	Between 50-75% cover of shallow water area	>75% cover of shallow water area	Poor	Good	Very Good	Juvenile Coho are closely associated with shallow water habitat that is predominated by fine substrates.(Friesen 2005). Juvenile Chinook also use this habitat but are not closely associated with it. (Whitman, Schroeder et al. 2017) Estimate via aerial inspection, e.g., a drone.
Condition	Water depth	Mean water depth in shallow water habitat	Less than 2 m	From 1.5 – 2.0 m	From >1.0 – 1.5 m	One meter or less	Poor	Good	Very Good	Appropriate average depth for juvenile Coho and other juvenile salmonids.(Friesen, Takata et al. 2003) Current status is “poor” because extent is small due to a steep riverbank. It is hoped that future management will increase shallow water habitat extent. Estimate by walking the shallow water habitat and measuring water depth.
Condition	Refugia	Amount or number of underwater structural cover per 500 sq. ft. in shallow water habitat (artificial or natural)	No underwater cover	<1% underwater cover	1-3% underwater cover	>3-5% underwater cover	Poor	Good to Very Good	Very Good	Estimate via aerial photos or a drone. Juvenile Coho need structural cover in shallow water habitats for refugia. (Roegner, McNatt et al. 2012) Currently we have no basis to establish appropriate goals or amount of cover per unit area; the amount of refugia per unit area will be a joint decision with partners informed by local science.

*Desired future condition

Table 2. Key ecological attributes for Riparian Forest at Willamette Cove

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT STATUS	DFC* FOR THIS SCP	LONG-TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Vegetative structure: shrub layer	% native shrub cover	<10% cover	10-25% cover	25-50% cover	>50% cover	Fair	Good	Very Good	Estimate via site walk. Indicator categories based on data from local study at 54 riparian study sites. Abundance and species richness of many bird and mammal species is associated with native shrub cover and woody vegetation volume. Puget Sound studies suggest that the fragmentation of upland vegetation and the total amount of riparian vegetation explain the greatest amount of variability in riparian bird communities. (Carey and Johnson 1995; Hennings 2001; Hagar 2003; Shandas and Alberti 2009; Hagar 2011)
Condition	Vegetative structure: tree layer	% native tree canopy cover	<20% cover	20-30% cover	30-40% cover	40% or more	Good	Very Good	Very Good	Estimate via site walk. Based on data from local study at 54 riparian study sites. In these sites, the best mix of native tree and shrub cover occurred when both were in the 40-60% range. Tree cover in this range tended to support healthy shrub communities and helped control European starlings. Note that some species, such as yellow-breasted chat, rely on native shrub habitat rather than forest, therefore if specific species are involved separate KEAs should be developed. (Hennings 2001)
Condition	Riparian habitat continuity	Gaps in woody vegetation	>2 gaps >50 m (55 yards) OR >3 or more 25-50 m (27-55 yards) gaps	1 or 2 gaps >50 m (54 yards) OR 2 or more gaps between 15-25 m (16-27 yards)	1, 25-50 m (27-55 y) gap OR 2 or more gaps between 15-25 m (16-27 yards)	0 or 1, 15-25 m (16-27 yards) gap	Poor	Good	Very Good	Estimate via GIS, per km stream length. Riparian contiguity for water quality and wildlife. Allows for continuity and a mosaic of cover percentages for wildlife that need (or create, such as beaver) openings. Puget Sound studies suggest that the fragmentation of upland vegetation and the total amount of riparian vegetation explain the greatest amount of variation in aquatic conditions. Studies document that some birds and small mammals are unwilling to cross vegetation gaps, with the most typical threshold being 50 m (164 ft) (Hennings and Soll 2010).

*Desired future condition

Table 3. Key ecological attributes for Oak-Madrone Woodland at Willamette Cove

CATEGORY	KEA	INDICATOR	---------- INDICATOR RATING ----------				CURRENT STATUS	DFC* FOR THIS SCP	LONG-TERM DFC	COMMENTS
			POOR	FAIR	GOOD	VERY GOOD				
Condition	Native grass and forb abundance	Relative cover of native forb and grass species	<20% of total herbaceous cover	20-30% of total herbaceous cover	30-50% of total herbaceous cover	>50% of total herbaceous cover	Poor	Fair	Good	High quality oak woodlands have a relatively open understory with shrubs, grasses and wildflowers. We used relative rather than total % cover because herbaceous cover is lower in woodlands compared to savanna and prairie. ODFW's *Oregon Conservation Strategy* 2005, Strategy Habitat description for oak woodlands.(Wildlife 2006)
Condition	Vegetation structure	Canopy cover and architecture of woody vegetation	Woody vegetation (e.g., Douglas fir) is encroaching and total native canopy cover is acceptable (30-60%) over less than half of the conservation target area.	Woody vegetation encroaching but total native canopy cover is 30-60% at least half of the target area.	Woody vegetation encroaching but total native canopy cover is 30-60% at least 90% of the target area.	Woody vegetation encroaching is generally absent, total native canopy cover is 30-60% in the target area, and canopy architecture is appropriate mix of large open grown trees / younger trees.	Poor	Fair	Good	Canopy cover based upon densiometer readings taken when all canopy trees are leafed out. If cover is estimated from aerial photography threshold cover categories should be increased by at least 5-10%. Tree species of concern in regard to invasion include in particular: *Pseudotsuga menziesii, Acer macrophyllum,, Prunus avium, Crataegus monogyna.*(Alverson 2009)

*Desired future condition

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APPENDIX A-3 | THREATS TO CONSERVATION TARGETS AT WILLAMETTE COVE

Threat ranks are affected by the proportion of a given Conservation Target on a given site (contribution), severity of stressors, and whether habitat management can reduce the threat (irreversibility). These variables' stress category ratings (Low – Very High) are combined for the overall threat rank.

SOURCE OF STRESS		CONSERVATION TARGETS AFFECTED	HABITAT DESTRUCTION / CONVERSION	ALTERED COMPOSITION / STRUCTURE	COMPETITION FOR RESOURCES	HUMAN DISTURBANCE	ALTERED HYDROLOGY	IMPAIRED HABITAT CONNECTIVITY	OVERALL THREAT RANK	COMMENTS
Remedial actions	Contribution	All	High	High	N/A	High	High	Low	High	Conservation goals may need to be adjusted as we gain clarity on the design and on-site impacts from remedial actions for addressing site contamination. At this time, there is uncertainty as to what the ultimate design and level of impact of remedial options will be. These may range from extensive site disturbance, grading, and soil removal that necessitates native vegetation removal, to options that have a lighter touch on the site. Metro is not a partner in the in-water remedial design; however, Metro is collaborating with in-water parties to discuss opportunities for restoration of fish, such as salmon and lamprey and provide clean water in this in-water zone, as well as restore native vegetation communities. Despite Metro efforts to coordinate on remedial action planning and implementation, the ultimate design and on-the-ground impacts from the remedial actions may impact priority resources.
	Irreversibility		Medium/High	Medium/High	N/A	Low	High	Low		
Development, land conversion	Contribution	All	High	Medium	Medium	High	High	Medium	Medium	This site is surrounded and heavily influenced by existing development. However, most of the site itself is undeveloped, and the surrounding level of development is unlikely to change. Future onsite park development is the key threat to the site.
	Irreversibility		High	High	Medium	High	High	Medium		
Fire suppression	Contribution	Oak-madrone woodland	High	Very High	High	N/A	N/A	High	High	Oak-madrone woodlands were historically maintained by periodic fires. Fire has been suppressed for many decades at Willamette Cove, allowing trees such as Douglas fir to overtop oak; oak trees need sun to thrive. The threat is not ranked very high because it only applies to the extent of oak-madrone habitat on the site rather than the entire site. Habitat management can abate this threat.
	Irreversibility		Low	Low	N/A	N/A	N/A	Medium-low		
Invasive species	Contribution		Very High	High	High	High	High	High	Very High	

SOURCE OF STRESS		CONSERVATION TARGETS AFFECTED	HABITAT DESTRUCTION / CONVERSION	ALTERED COMPOSITION / STRUCTURE	COMPETITION FOR RESOURCES	HUMAN DISTURBANCE	ALTERED HYDROLOGY	IMPAIRED HABITAT CONNECTIVITY	OVERALL THREAT RANK	COMMENTS
	Irreversibility	All excluding shallow water habitat	Low	Low	?	Low	High	Low		Invasive species are a significant threat to this site, particularly in the shrub and herbaceous layers, but can be controlled over time and replaced with native plants with climate change in mind. We exclude shallow water habitat here, although presence of invasive non-native fish may be present and predate juvenile salmon. It should be noted that shallow water habitat deters most undesirable non-native fish species in the Lower Willamette. Invasive tree species could significantly negatively affect habitat at the site but can be managed.
Human use, dogs, trails, fishing, etc.	Contribution	All	High	High	Very High	High	Very High	High	Medium-High	This site currently has moderate unauthorized human disturbance including people with dogs. Effects of disturbance on habitat and wildlife are well-documented.[1] Shallow water habitat also receives disturbance via boats and people on the waterline; this area provides or could provide key juvenile Coho salmon habitat. Planned visitor access on land and water can help reduce these impacts.
	Irreversibility		Medium	Medium	Medium	Medium-High	Medium	Medium		
Climate change	Contribution	All	High (oak may not be as negatively affected)	High	?	N/A	Very High (shallow water habitat)	High	High	During summer, climate change is anticipated to increase low flow water temperatures and reduce availability of water. Some indirect effects of climate change may include range

[1] https://www.oregonmetro.gov/recreation-ecology-literature-review.

SOURCE OF STRESS		CONSERVATION TARGETS AFFECTED	HABITAT DESTRUCTION / CONVERSION	ALTERED COMPOSITION / STRUCTURE	COMPETITION FOR RESOURCES	HUMAN DISTURBANCE	ALTERED HYDROLOGY	IMPAIRED HABITAT CONNECTIVITY	OVERALL THREAT RANK	COMMENTS
	Irreversibility		Medium-Low	Low	?	N/A	Medium-Low	High		shifts of plants and animals, some native to North America and some not, and increased competition by these species. For plant understory communities, it is desirable to avoid any single or few species from becoming dominant unless the species is closely associated with the conservation target. It is possible and perhaps likely that climate change will influence every KEA in each habitat, though effects on some KEAs may be more important than others. Note that more recent Willamette Valley climate change projections suggest that Douglas fir is at risk, whereas Oregon white oak is projected to remain with a likely increase in extent; this could affect any or all Douglas fir at the site.[2] Winter storms, increased in severity, will increase flooding in some areas, feasibly affecting the lower elevation portions of the site. This could affect habitat – for example, tree mortality from flooding or washout of small shallow water substrate due to increased water velocity – as well as potentially damaging future lower elevation trails and other infrastructure. Regarding habitat connectivity, planting cottonwood gallery forest along the shoreline will increase habitat connectivity along the Lower Willamette; riverside habitats are critical movement and habitat corridors in most areas. Increasing oak at the site could increase connectivity for oak-related species; shallow water habitat could increase connectivity for juvenile Coho.
Steep riverbank	Contribution	Shallow water habitat	Very High	Very High	Very High	Medium	Medium	Very High	Very High	The steep riverbank at Willamette Cove is a threat to healthy shallow water habitat, the preferred habitat of juvenile Coho salmon. It is feasible that bank layback and creation of a shallow gradient can be accomplished during remediation of contaminants. It may also be a limiting factor for establishing cottonwood gallery forest along the riverbank.
	Irreversibility		Low	Low	Low	Medium	Low	Low		
Invasive Lombardy poplar (*Populus nigra*)	Contribution	Bottomland Hardwood Forest	Low	High-Very High	?	Low	Low	Medium	High	Lombardy poplar is a significant threat to black cottonwood trees at Willamette Cove and alters the composition of the desired black cottonwood forest.
	Irreversibility		Low	Low	?	Low	Low	Medium		
Legacy toxics	See note	Toxics are a very high threat to water quality near the riverbank. If the toxics remediation action occurs by partners, leaving the bank in its current condition, it should be noted that the entity executing bank layback would also be liable for uncovering toxics.								

[2] https://people.wou.edu/~taylors/es476_hydro/poster_2018/1_Turner_etal_2015_Willmatte_Climate_change_Nick.pdf

APPENDIX A-4 | HISTORIC VEGETATION AND INVASIVE SPECIES

HISTORIC VEGETATION INFORMATION

Since the late 1800s, the Willamette River topography and hydrology through Portland has been altered substantially by urban and industrial development. Complexity in the form of sloughs, side-channels, wetlands, islands and shallow water habitat along the shoreline have been nearly eliminated throughout the north and middle reaches of the Willamette River in Portland by both excavation and filling to create the current simplified, deep and straight channel suitable for development and commerce (Map A-4.1). Riparian and floodplain forests have also been dramatically reduced in extent through direct and indirect conversion. At the same time, flood control dams in the upper watershed have changed flow patterns and reduced the historic seasonal flooding that helped create and sustain the more complex system. At a site scale, drawings and photographs from the mid- to late 19th century, and GLO survey information show a substantially different riverbank at the Willamette Cove site than what is there now. Changes, including excavation of the inner cove to create the railroad bridge, adding fill to shoreline areas and other landscape modifications completed for increased human settlement along the shoreline and bluffs above the river have resulted in a site that bears only a general resemblance to what was once there.

It is tempting to focus on the historic topography, ecology and vegetation of the Willamette Cove site and to pursue restoration efforts aimed at returning the site to a more original condition. Due to the widespread changes at the site and throughout the Willamette River system, including adjacent uplands, however, Metro suggests it may instead be both more meaningful and more achievable to focus on functions and habitat types lost from the river system as a whole and consider which of those can best be restored at Willamette Cove given the current setting and resultant limitations. Willamette Cove is small, highly altered and constrained by its urban setting. Much of the surrounding Portland Harbor area will remain industrial and residential, with a riverbank that no longer assumes the shape and function of what was present historically and highly altered uplands in the supporting watershed. Keeping that in mind and focusing on limiting factors for restoring desired features and functions, we can work to create important habitat features along the river and in the uplands, while not necessarily trying to recreate the exact habitat that once existed at what is now called Willamette Cove.

The landscape patterns of the lower Willamette River can be determined with a reasonable degree of certainty from local source material, the Historical Vegetation of the Willamette Valley, Oregon, circa 1850 by John A. Christy and Edward R. Alverson[1], as well as the General Land Office maps and notes[2] (Appendix A-4 maps 1 and 2). The latter two map sources document a complex river system supporting extensive wetlands, riparian and floodplain forest. Associated upland areas included wetlands and diverse forest types, especially including oak and savanna-prairie habitats that have suffered extensive regional declines.

[1] Historical Vegetation of the Willamette Valley, Oregon, circa 1850 John A. Christy, Edward R. Alverson. 2011
[2] GLO Historical Vegetation of the Willamette Valley, Oregon 1851-1910. Oregon Biodiversity Information Center. Portland State University

While recognizing its limitations at a site scale, Metro and many other land managers consider the Christy-Alverson map and underlying data as the standard for understanding historic vegetation patterns within the region. Christy and Alverson drew from the original GLO maps and survey notes as well as bearing tree data to reconstruct regional vegetation. While we have high confidence in that work for describing patterns along the lower Willamette, at Willamette Cove, the shortcomings of that map at a site level are especially profound. The base map used by the authors uses the modern shoreline rather than the shoreline present in the mid-1800s. The General Land Survey map (Map A-4.2) shows a more correct version, including of river channel slopes. While historically the riverbank may have had a slight indentation into the shoreline, it was not the cove that is present today. The historic vegetation map, as well as the GLO hand drawn maps document the complexity of habitats in the lower Willamette (Maps A-4.1 and A-4.2) and demonstrate that riparian forest was present on site and along the Willamette River throughout the area prior to excavation at the site and the widespread development (Map A-4.1). Through industrial development the bank became steeper and hardened with manufactured material and the shoreline highly disturbed and filled in places.

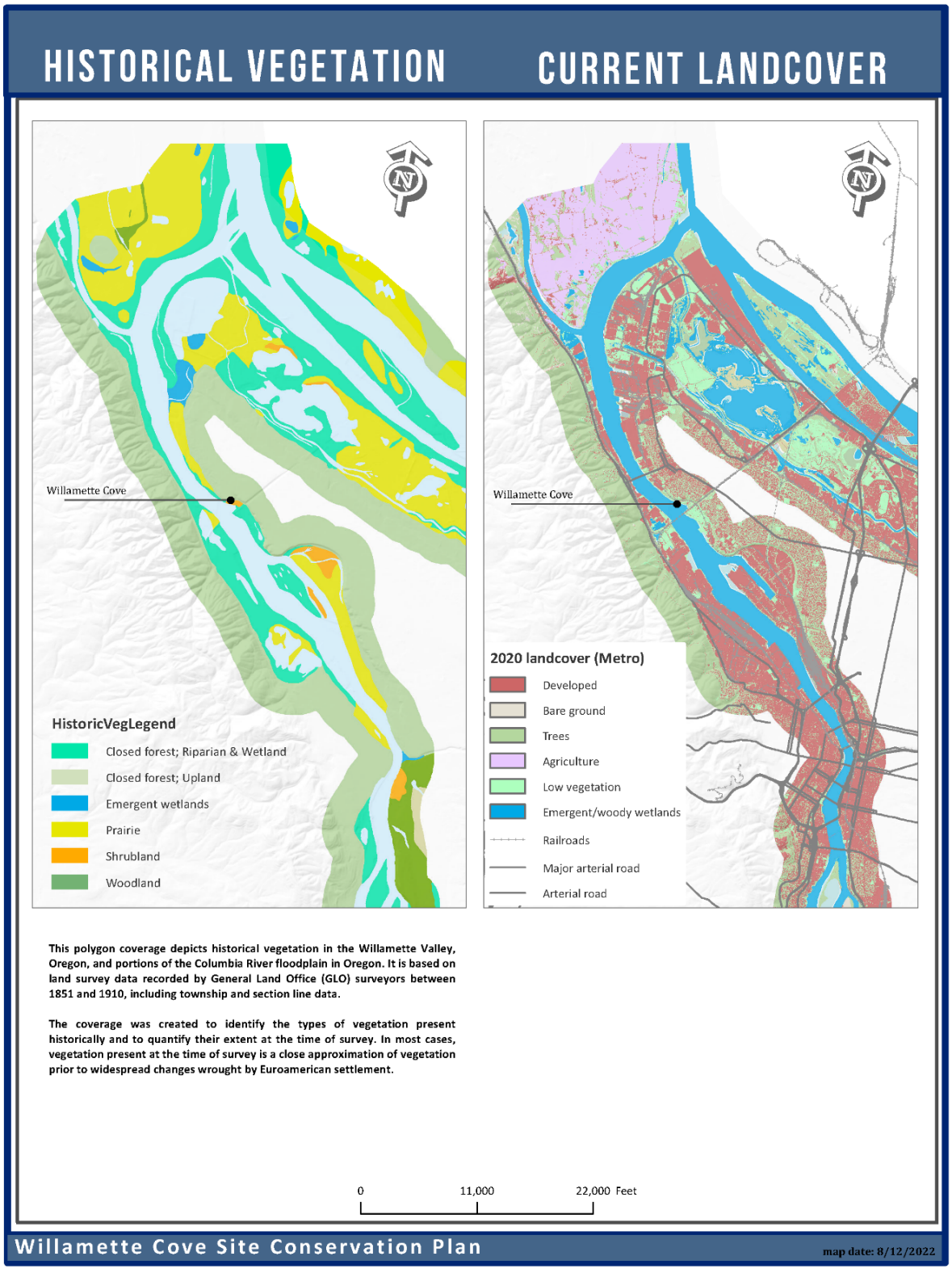
On the left side of Map A-4.2, over the Christy and Alverson historic vegetation layer, the historic river line as mapped in the GLO notes (and shown on the right of Map A-4.2) is represented in blue. The GLO survey map suggests there was less of a cove than the historic vegetation map suggests, and the fill used for the railroad bridge was not present. The riverbank as it is today is represented on the historic vegetation map, creating a false impression of the presence of terrestrial habitat where there was water at that time. These small inconsistencies do not change the overall story. Those widespread changes in the lower river and at the Willamette Cove site itself have led to a loss of certain habitats and function—some of which we can seek to replace at Willamette Cove. However, the lack of clarity does create uncertainty in what was specifically on the Willamette Cove site historically.

Analysis of changes in the lower Willamette River and at Willamette Cove, and uncertainty related to the specifics of Willamette Cove, suggest that focusing on restoring/creating shallow water habitat, riparian/floodplain forest habitat in form of black cottonwood gallery forest and oak-madrone woodland or savanna in the uplands will best address regional limiting factors within the context of the current site and landscape, and match existing framing conditions of the surrounding area.

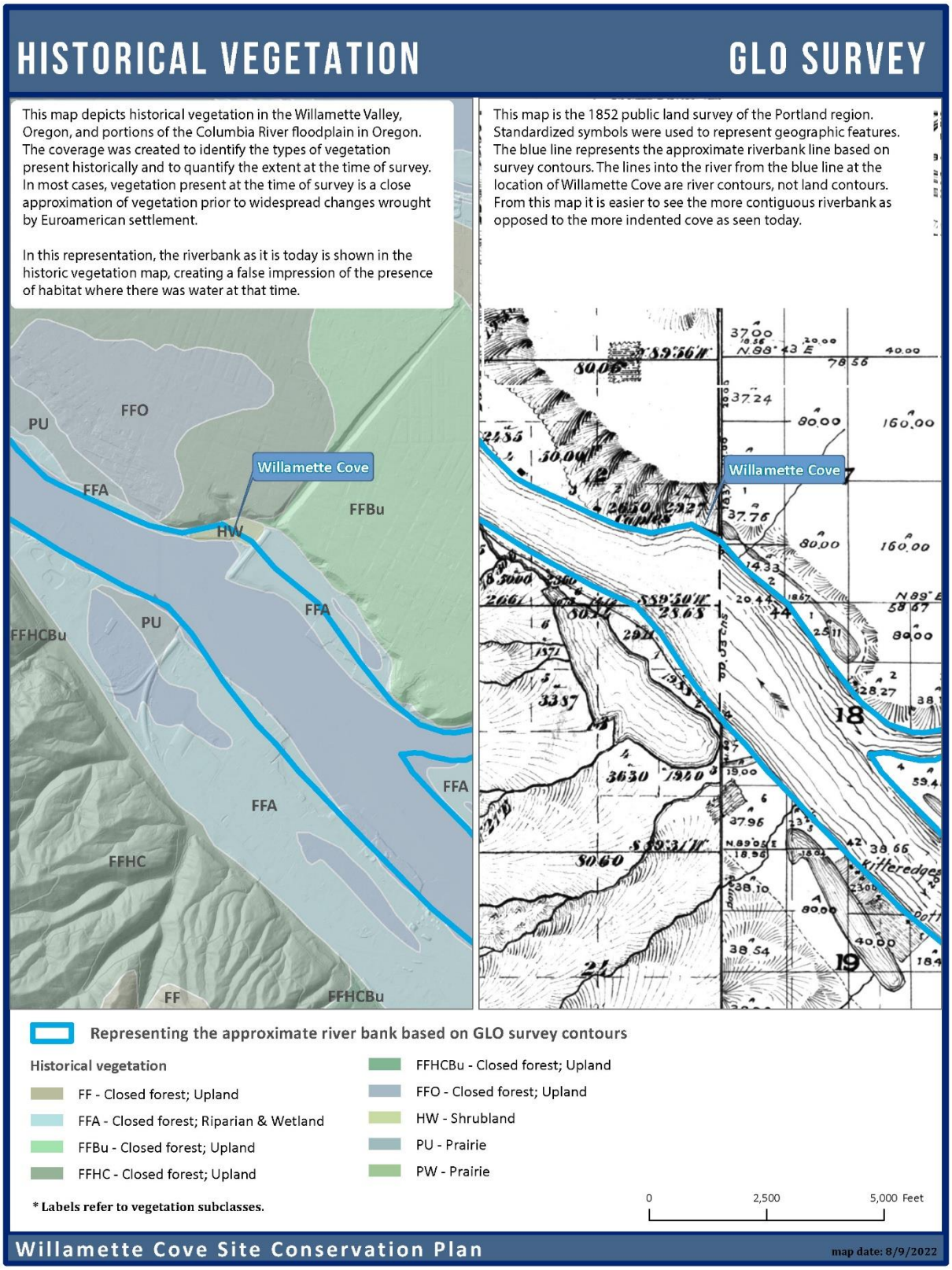
Map A-4.1. Historical vegetation and current cover

Map A-4.1 on the following page compares historical versus current vegetation patterns and landform in the landscape surrounding Metro's Willamette Cove site in the lower Willamette River. Historical data is derived from a combination of Government Land Office survey maps and notes and bearing tree data collected between 1851 and 1910. Modern data is derived from Metro data sources. While not dependable at the site scale, this analysis and the resulting maps are widely considered to be the best existing assessment of historical vegetation patterns on the landscape prior to colonial settlement. Comparison shows a loss of overall complexity in the river system as well as a large-scale loss of riverine, wetland and upland terrestrial habitats, especially including riparian forest and prairie and oak types.

Map A-4.1 Historical vegetation and current landcover



Map A-4.2 Historical vegetation and GLO survey in the immediate area of Willamette Cove



NATIVE SPECIES

While the site is currently dominated by non-native vegetation, species endemic to the area are present. Native trees include, Black cottonwood (*Populus trichocarpa*), Oregon white oak (*Quercus guaryana*), Pacific madrone (*Arbutus menziesii)*, Pacific willow (*Salix lasiandra*), Scouler's willow (*Salix scouleriana*), Western red cedar (*Thuja plicata*), Pacific yew (*Taxus brevifolia)* and Big leaf maple (*Acer macrophyllum).* Native shrubs include Oregon grape (*Mahonia aquifolium)*, Snowberry (*Symphoricarpos albus)*, and Red flowering currant (*Ribes sanguineum)*.

INVASIVE SPECIES

In addition to diverse native vegetation currently present, Willamette Cove has multiple robust populations of non-native plants due to its location as a former industrial area and adjacent to dense residential areas. During the construction of the railroad lines at the beginning of the 20th century, many plants were introduced from overseas. Trees such as deodora cedar (*Cedrus deodara*) golden chain tree (*Laburnum watereri*) and Lombardy poplar (*Populus nigra*) are present throughout the site. There are also substantial populations of Scotch broom (*Cytisus scoparius*), English holly (*Ilex aquafolium*), English ivy (*Hedera helix*), and Himalayan/Armenian blackberry (*Rubus armeniacus*).

Priority noxious weeds noted for early detection and rapid response removal are Japanese and Bohemian knotweed (*Polygonum cuspidatum*), spurge laurel (*Daphne laureola*) and milk thistle (*Silybum marianum*) and have been treated regularly at the site.

The table below summarizes a preliminary list of invasive plants requiring control in all or parts of Willamette Cove Natural Area, including focus areas and timing for control. Invasive species will be controlled as part of restoration projects or ongoing management of habitat areas. A list of noxious weeds for Oregon, including descriptions and photos, can be found at: www.oregon.gov/ODA/PLANT/WEEDS/statelist2.shtml.

Table 1. Priority non-native species to be managed at Willamette Cove Natural Area.

GENUS	SPECIES	COMMON NAME	FOCUS AREA FOR DETECTION/CONTROL	CONTROL TIMING
Cytisus	*scoparius*	Scotch broom	Oak (madrone) woodland	Fall
Polygonum	*cuspidatum*	Japanese knotweed	All but Oak habitat within bluffs	Fall
Rubus	*armeniacus*	Himalayan blackberry	All	Early summer
Hedera	*Helix*	English Ivy	All	Winter
Daphne	*laureola*	Spurge Laurel	All	Spring/Fall
Ilex	*aquifolium*	English Holly	All	Fall
Various		Various and sundry broadleaf weeds	All	Early spring/fall

Map A-4.3 shows tree species identified during vegetation survey work in 2015.

Map A-4.3. Willamette Cove vegetation survey, 2015.

APPENDIX A-5 | WILDLIFE

Wildlife observed at Willamette Cove Natural Area – upland and in-water (as of July 1, 2022)

Common name	***Scientific name***
BIRDS	
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Robin	*Turdus migratorius*
Anna's Hummingbird	*Calypte anna*
Bald Eagle	*Haliaeetus leucocephalus*
Barn Swallow	*Hirundo rustica*
Belted Kingfisher	*Megaceryle alcyon*
Bewick's Wren	*Thryomanes bewickii*
Black-capped Chickadee	*Poecile atricapillus*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Black-throated Gray Warbler	*Setophaga nigrescens*
Brown Creeper	*Certhia americana*
Brown-headed Cowbird	*Molothrus ater*
Bushtit	*Psaltriparus minimus*
California Gull	*Larus californicus*
California Scrub Jay	*Aphelocoma californica*
Canada Goose	*Branta canadensis*
Cedar Waxwing	*Bombycilla cedrorum*
Common Raven	*Corvus corax*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	*Accipiter cooperii*
Dark-eyed Junco	*Junco hyemalis*
Double-crested Cormorant	*Nannopterum auritum*
Downy Woodpecker	*Dryobates pubescens*
European Starling	*Sturnus vulgaris*
House Sparrow	*Passer domesticus*
Glaucous-winged Gull	*Larus glaucescens*
Golden-crowned Kinglet	*Regulus satrapa*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Great Blue Heron	*Ardea herodias*
Great Horned Owl	*Bubo virginianus*
Hairy Woodpecker	*Dryobates villosus*
Herring Gull	*Larus argentatus*
House Finch	*Haemorhous mexicanus*
House Wren	*Troglodytes aedon*
Mallard	*Anas platyrhynchos*
Mourning Dove	*Zenaida macroura*
Northern Flicker	*Colaptes auratus*
Olive-sided Flycatcher	*Contopus cooperi*
Orange-crowned Warbler	*Leiothlypis celata*
Osprey	*Pandion haliaetus*
Pacific-slope Flycatcher	*Empidonax difficilis*
Peregrine Falcon	*Falco peregrinus*
Purple Finch	*Haemorhous purpureus*
Red-breasted Merganser	*Mergus serrator*

Red-breasted Nuthatch	*Sitta canadensis*
Red-tailed Hawk	*Buteo jamaicensis*
Ring-billed Gull	*Larus delawarensis*
Rufous Hummingbird	*Selasphorus rufus*
Sharp-shinned Hawk	*Accipiter striatus*
Song Sparrow	*Melospiza melodia*
Spotted Towhee	*Pipilo maculatus*
Steller's Jay	*Cyanocitta stelleri*
Tree Swallow	*Tachycineta bicolor*
Turkey Vulture	*Cathartes aura*
Violet-green Swallow	*Tachycineta thalassina*
Western Tanager	*Piranga ludoviciana*
Western Wood-Pewee	*Contopus sordidulus*
White-crowned Sparrow	*Zonotrichia leucophrys*
Yellow-rumped Warbler	*Setophaga coronata*
MAMMALS	
California Ground Squirrel	*Otospermophilus beecheyi*
California Sea Lion	*Zalophus californianus*
Coyote	*Canis latrans*
Columbian Black-tailed Deer	*Odocoileus hemionus columbianus*
Common Raccoon	*Procyon lotor*
Eastern Cottontail Rabbit	*Sylvilagus floridanus*
Little Brown Myotis	*Myotis lucifugus*
Long-tailed Weasel	*Mustela frenata*
River Otter	*Lontra canadensis*
Townsend's Chipmunk	*Tamias townsendii*
Townsend's Mole	*Scapanus townsendii*
Virginia Opossum	*Didelphis virginiana*
FISH	
Pacific Lamprey	*Entosphenus tridentatus*
Salmon – Chum, Coho, Chinook	*Oncorhynchus keta, O. kisutch, O. tshawytscha*
Trout – Steelhead, Cutthroat and Rainbow	*Oncorhynchus mykiss, O. clarkii*
White Sturgeon	*Acipenser transmontanus*
(Various non-native fish species)	
AMPHIBIANS	
Northern Red-legged Frog	*Rana aurora*
Pacific Chorus Frog	*Pseudacris regilla*
Ensatina	*Ensatina eschscholtzii*
REPTILES	
Western Skink	*Plestiodon skiltonianus*
Northwestern Garter Snake	*Thamnophis ordinoides*